2023 Residential Massachusetts Stretch Code Frequently Asked Questions

EXISTING BUILDINGS

Additions

Question: When is a HERS Rating required for an addition?

Answer: A HERS Rating is required where the total added conditioned floor area is greater than 1,000 square feet or the addition exceeds 100% of the existing dwelling unit conditioned floor area.

Code Reference: *2023 Massachusetts Stretch Energy Code* R502.1.1

Question: If multiple additions are made to the same dwelling unit and each is under 1,000 square feet, but the total adds up to more than 1,000 square feet, is a HERS Rating required?

Answer: Yes, the floor area of multiple additions being made as part of the same permitted project should be treated cumulatively. When two or more additions add up to greater than 1,000 square feet, a HERS Rating is required. (Note: If two additions are made to a home but at quite different points in time, and a permit is closed on one addition before a new permit is opened for a second addition, then floor area is not treated cumulatively.)

Code References: *2023 Massachusetts Stretch Energy Code* R502.1.1 with interpretation based on personal communication with the Massachusetts Department of Energy Resources

Question: Is the floor area trigger for when a HERS Rating is required for additions based on *conditioned* floor area?

Answer: Yes, only *conditioned* floor area is included when determining whether the addition requires a HERS Rating.

Code References: *2023 Massachusetts Stretch Energy Code* R502.1.1 with interpretation based on personal communication with the Massachusetts Department of Energy Resources

Question: Can a HERS Rating be performed on an addition?

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Answer: It depends. HERS Ratings may only be performed on *dwelling units*, so if the addition contains areas for living, sleeping, eating, cooking, and sanitation, a HERS Rating may be performed on the addition. If the addition is not a dwelling unit, the HERS Rating must be performed on the existing home plus the addition.

Code References: *2023 Massachusetts Stretch Energy Code* R502.1.1, ICC/RESNET Standard 301.

Question: Is a blower door test required for additions that trigger the requirement for a HERS Rating?

Answer: Yes. Blower door testing is a required element of a HERS Rating.

Code References: *2023 Massachusetts Stretch Energy Code* R502.1.1, ICC/RESNET Standard 301.

Question: Is a blower door test required for additions that do not trigger the requirement for a HERS Rating and are allowed to follow the prescriptive path?

Answer: In most cases, blower door testing is not required because passing the test would require performing work on the existing building. IECC Chapter 5 states that additions must comply as they relate to new construction "without requiring the unaltered portion of the existing building or building system to comply." However, where feasible and practical, a code official could require testing of the addition alone.

Code References: IECC R502.1 and R502.3.1

Question: Is EV readiness required for additions or only for new construction?

Answer: EV readiness is only required for new construction as the alterations section in Chapter 5 makes no reference to the EV ready section.

Code Reference: *2023 Massachusetts Stretch Energy Code* R502 and R404.4

Question: Is solar readiness required for additions?

Answer: Solar readiness is required for additions that are 1,000 square feet or greater. Additions that are less than 1,000 square feet are exempt.

Code Reference: *2023 Massachusetts Stretch Energy Code* Appendix RB101.1

Alterations

Question: If an alteration meets the definition of a Level 3 alteration under the IEBC or an extensive alteration under IRC Appendix AJ, but does not exceed 1,000 square feet or 100% of the existing floor area, is a HERS Rating required? Likewise, if an alteration does not meet the definition of a Level 3 alteration, but exceeds 1,000 square feet or 100% of the existing floor area, is a HERS Rating required?

Answer: No. A HERS Rating is only required for alterations that meet the definition of a Level 3 alteration under the IEBC or an *extensive alteration* under IRC Appendix AJ *and* exceed 1,000 square feet or 100% of the existing floor area.

Code References: *2023 Massachusetts Stretch Energy Code* R503.1.5, *International Existing Buildings Code* 604.1, *International Residential Code* AJ109.3

Question: Is the floor area trigger for when a HERS Rating is required for alterations based on *conditioned* floor area?

Answer: Yes, only *conditioned* floor area is included when determining whether the alteration requires a HERS Rating.

Question: Is a blower door test required for alterations that trigger the requirement for a HERS Rating?

Answer: Yes. Blower door testing is a required element of a HERS Rating.

Code References: *2023 Massachusetts Stretch Energy Code* R503.1.5, ICC/RESNET Standard 301.

Question: Is a blower door test required for alterations that do *not* trigger the requirement for a HERS Rating and therefore are allowed to follow the prescriptive path?

Answer: In most cases, blower door testing is not required because passing the test would require performing work on the existing building. IECC Chapter 5 states that additions must comply as they relate to new construction "without requiring the unaltered portion of the existing building or building system to comply."

Code References: IECC R503.1 and R503.1.1

Question: For an alteration that does not trigger the requirement for a HERS Rating, is the project required to meet the prescriptive wall insulation R-value requirement (R-30 cavity-only or R-20&5ci or R-13&10ci or R-20ci)[1]?

[1] The abbreviation "ci" stands for continuous insulation. Where two R-values are given, the first value is for cavity insulation and the second value is for continuous insulation. For example, R-20&5ci means R-20 cavity insulation and R-5 continuous insulation.

Answer: No. Cavities exposed during an alteration are required to be filled with insulation, but there is no minimum R-value requirement. The same exception applies to all other envelope assembly types.

Code Reference: 2021 IECC Section 503.1.1, Exception 2.

Question: When installing a new, ducted heating or cooling system in an existing home, is duct leakage testing required?

Answer: Yes. All the requirements of R403 (Systems) apply to new heating and cooling systems installed in existing homes, including duct leakage testing. The only exception to duct leakage testing for alterations is for ducts that are extended from an existing heating or cooling system to an addition.

Code References: 2021 IECC R502.3.2 Heating and cooling systems.

Question: Is EV readiness required for alterations?

Answer: No. EV readiness is only required for new construction as *Section R503 – Alterations* makes no reference to the EV ready section.

Code Reference: *2023 Massachusetts Stretch Energy Code* R503 and R404.4

Question: Is solar readiness required for alterations?

Answer: No. Solar readiness is not required for alterations. The solar-ready provisions apply only to new construction as *Section R503 – Alterations* makes no reference to *Appendix RB Solar Ready Provisions*. In addition, Appendix RB states that, "these provisions shall be applicable for new construction, except additions under 1,000 sq ft."

Code Reference: *2023 Massachusetts Stretch Energy Code* R503 and Appendix RB101.1

ELECTRIC VEHICLE READINESS

Question: Under the Massachusetts Stretch Code, what does it mean for a parking space to be electric vehicle (EV) ready?

Answer: For a parking space to meet the *EV Ready Spaces* requirement, the space must be equipped with a dedicated electrical circuit. This means there needs to be adequate electric service capacity and wiring with a termination within 6 feet of the space. The dedicated branch circuit must be identified in

the electrical panel or subpanel directory as "EV READY." The circuit must terminate in either a NEMA receptacle (standard outlet) or a Society of Automotive Engineers (SAE) Standard SAE J1772 electrical connector for servicing electric vehicles. The termination must also be marked as "EV READY".

Code Reference: *2023 Massachusetts Stretch Energy Code* R404.4

Question: What if the house does not have a garage, where is the circuit supposed to terminate?

Answer: The code requires the circuit to terminate within 6 feet of the parking space, regardless of whether there is a garage. The code does not contain termination requirements beyond the types of allowable termination. If a house does not have a garage, the electrician might consider terminating the circuit with a weatherproof outdoor receptacle on the side of the home, embedded in parking area pavement, or on a post near the space.

Code Reference: *2023 Massachusetts Stretch Energy Code* R404.4

Question: Does EV readiness apply to buildings that have no onsite parking?

Answer: In the absence of onsite parking, EV readiness is not required. Exception 1 of R404.4 states that, "In no case shall the number of required EV Ready Spaces be greater than the number of parking spaces installed." Further, exception 2 states that, "This requirement will be considered met if all spaces which are not EV Ready are separated from the premises by a public right-of-way."

Code Reference: *2023 Massachusetts Stretch Energy Code* R404.4, exceptions 1 and 2.

Question: Many lake houses have parking spaces located across the street from the main structure. Is electric vehicle readiness required in that case?

Answer: Exception 2 of R404.4 states that, "This requirement will be considered met if all spaces which are not EV Ready are separated from the premises by a public right of way.

Code Reference: *2023 Massachusetts Stretch Energy Code* R404.4, exception 2.

Question: Who is responsible for enforcing the regulations regarding wiring requirements? Is it the local building inspector or the electrical inspector?

Answer: Decisions regarding enforcement are made at the local level. DOER believes that the building inspector should confirm that the wiring is present, while the electrical inspector ensures that the wiring has been installed to meet the specifications of electric vehicle readiness and the *Massachusetts Electrical Code*.

Code Reference: Personal communication with the Massachusetts Department of Energy Resources (DOER)

SOLAR READY PROVISIONS

Question: If the building design does not allow for the required solar-ready zone area due to obstacles such as vents, chimneys, and roof-mounted equipment, does the project still need to comply with the solar-ready provisions?

Answer: Yes. The stretch code adopts the IECC 2021 Appendix RB without amendments, and the appendix states that solar-ready zones shall be free from obstructions. In addition, a section on shading requires that the solar-ready zone be set back by a certain distance from any object on the building or site that will shade the zone. The code does not provide exceptions for rooftops with obstructions that interfere with the free area required for a solar-ready zone, so in these cases, a redesign is required. Designers should consider this requirement early in the design process.

Code Reference: *2023 Massachusetts Stretch Energy Code* Appendix RB103.4

Question: Is there a minimum solar electric system size for a home to meet the solar-ready provisions?

Answer: No. *Appendix RB Solar-ready Provisions* does not contain any requirements related to solar equipment, and as such, does not specify a minimum solar system capacity in kilowatts. The only size-related requirement is the area in square feet of the designated solar-ready zone. For homes with at least 600 square feet of roof area oriented between 110 and 270 degrees of true north, the solar ready zone must be at least 300 square feet. For townhomes with a total floor area of 2,000 square feet or less, the solar ready zone must be at least 150 square feet. The solar-ready zone may be split into multiple zones, but individual zone areas must be at least 80 square feet in area and at least 5 feet wide.

Code Reference: Appendix RB Section RB103.3

Question: Do the Solar-ready Provisions require conduit or wiring to be installed from the solar-ready zone to the electrical panel?

Answer: No. The Solar-ready Provisions require the construction documents to indicate pathways for routing conduit or plumbing from the solar-ready zone to the electrical panel or service hot water system, but no conduit, wiring, or plumbing are required to be installed. In addition, reserved space in

the electrical panel labeled as "for future solar electric" is required, and for flat roofs, a capped roof penetration must be installed.

Code Reference: *2021 IECC Appendix RB* RB103.1, RB103.6, RB103.8, and RB103.9

Question: Where is the capped roof penetration sleeve required to be located?

Answer: The capped roof penetration sleeve in a solar ready design required by Appendix RB must be "adjacent to the designated solar-ready zone." Note that a capped roof penetration sleeve is only required for roofs with slopes less than or equal to 1:12, which is essentially a flat roof.

Question: Does the sleeve for the solar system have to be run to the panels or is a different configuration allowed?

Answer: No. There is no requirement to install conduit from the solar ready zone to the electric panel; the roof penetration sleeve as required per the previous Q&A makes it easier to install conduit in the future. The capped roof penetration sleeve shall be sized to accommodate photovoltaic system conduit. The code does not specify how large the diameter of the sleeve needs to be to accommodate a future photovoltaic system, but it does state that the sleeve's inside diameter may not be less than 1¼ inches.

Code Reference: Appendix RB Section RB103.6

NEW CONSTRUCTION

Question: Can a home with a fossil fuel backup generator still qualify as "all-electric" to be eligible for the trade-off for clean energy systems (i.e., 3-point increase in maximum HERS Index)?

Answer: Yes. Fossil fuel powered backup generators are allowed in all-electric homes.

Code Reference: Personal communication with DOER

Question: Would a rooftop fireplace/grille disqualify a building from being all electric?

Answer: DOERs approach to the subject of fireplaces and grilles is based on whether they are built-in and piped in or freestanding.

So, for example having a portable grill with a replaceable propane cannister/tank on the deck is fine, having a built-in cooking area or fireplace than relies on a replacement cannister/tank is also fine, but

having a built-in grill or fireplace with a permanent in-ground propane tank or gas supply line makes it a mixed-fuel building. Essentially if the fossil fuel infrastructure is built-in to the building even if serving an outdoor area then it is mixed fuel. If the fuel using equipment is easily movable from one home to another – e.g., a standby generator or portable grill then it is fine.

Code Reference: Personal communication with DOER

Question: If an abutting commercial space were not all-electric, would this disqualify a building from being all electric? For example, a café below two stories of housing

Answer: For mixed use buildings. The stretch code allows you to use different compliance paths for different portions of the building. So, a mixed-use building with restaurant/retail on the ground floor and residential units above can be mixed fuel on the ground floor and still be all-electric for the residential units. This means that it can use HERS 44 or 55 or Passive house for the residential space and be all-electric even if the restaurant/retail space is using gas and is mixed fuel following the prescriptive or ASHRAE path.

Of course, any gas supply to the restaurant cannot also be used to provide heating or cooking in the residential units or in the common space of the residential use if they want to be all-electric residential.

Code Reference: Personal communication with DOER

1

2

David 3.19.2024

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Presented by:

PSD

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Continuing Education

This webinar is approved for:

- 3 hours of RESNET CEUs
- MA Code Official CEUs

Everyone will receive a certificate of attendance via email

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2023 Massachusetts Stretch Code
225 CMR 22

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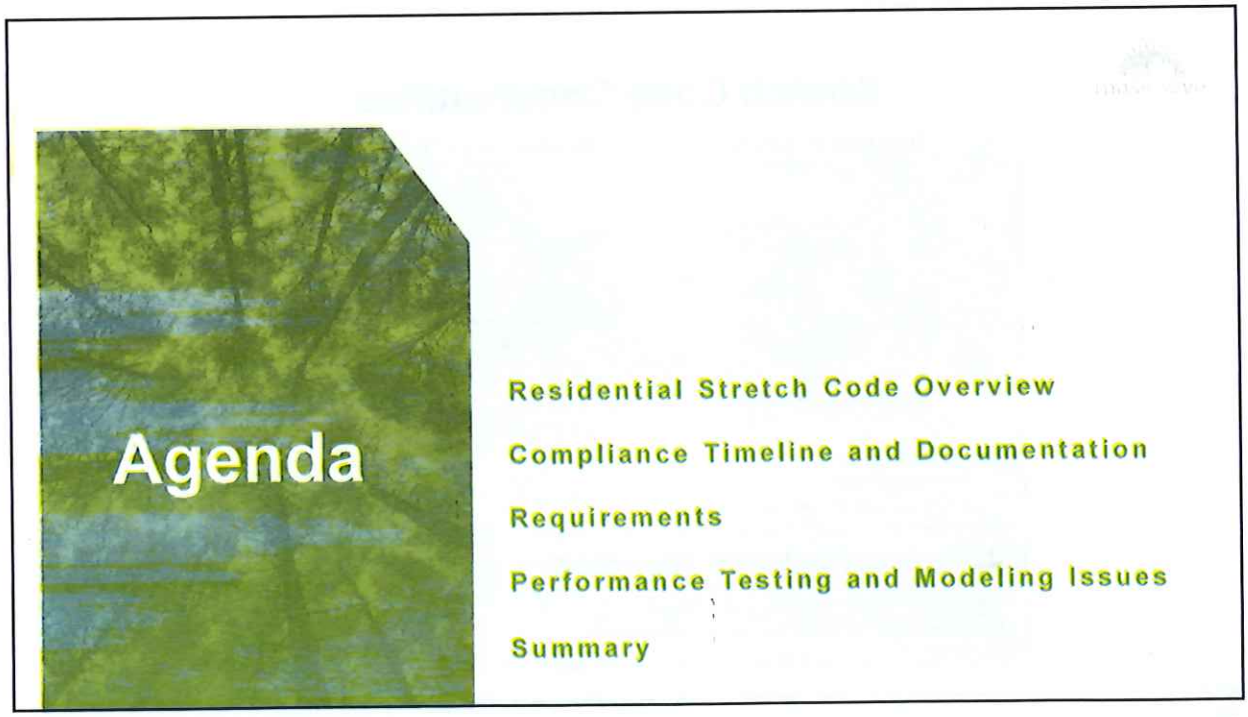
Agenda
Residential Stretch Code Overview
Compliance Timeline and Documentation Requirements
Performance Testing and Modeling Issues
Summary

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2023 Residential Stretch Code Overview

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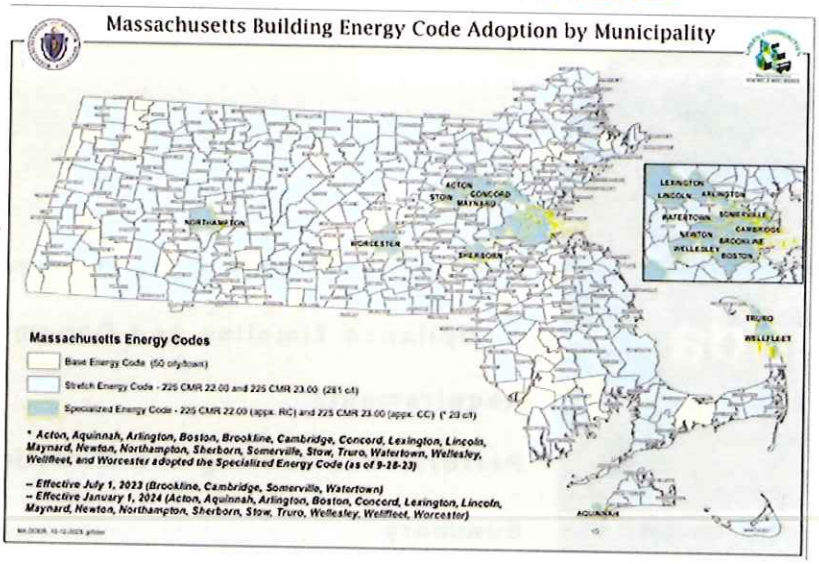
Stretch Code Communities



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Stretch Code Updates

225 CMR 22: MASSACHUSETTS RESIDENTIAL STRETCH ENERGY CODE AND MUNICIPAL OPT-IN SPECIALIZED CODE 2023

Massachusetts Stretch Code and Specialized Code for Low-Rise Residential

(Note: please see 225 CMR 23 for Commercial, Multi-family and all other construction)

The Massachusetts Stretch energy code (Stretch Code) first became available for municipal adoption in 2009 as Appendix 110.aa and then 115.aa as part of the building code in 780 CMR. In 2021 the Massachusetts legislature passed new legislation moving authority for updates to the Stretch Code to the Department of Energy Resources and 225 CMR.

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Overview

1 Jan. 2023

Maximum HERS Index decrease from 55 to 52
Large additions and alterations must follow ERI path
HRV/ERV required
Specialized Stretch Code available for adoption

Maximum HERS Index decrease from 52 to 42

1 July 2024

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The Stretch Code and Existing Buildings

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Additions & Alterations

≤ 1,000 sqft and 100% of existing building area

> 1,000 sqft and 100% of existing building area

Chapter 5 [RE] Existing Buildings

Energy Rating Index R406

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Residential Stretch Code Scope

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- R-use buildings of three stories or less above grade plane
- *Each dwelling unit* shall comply with section N1106 (R406) – *Energy Rating Index Compliance Alternative* of 225 CMR 22 (includes Massachusetts amendments)

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R401 Scope Compliance Options for Stretch Code

New Construction

R401.2.2 Passive House

- The Passive House Building Certification Option requires compliance with Section R405 and R404.4.

R401.2.3 Energy Rating Index

- The Energy Rating Index (ERI) Option requires compliance with Section R406, R403.6 and R404.4.

R401.2.4 Appendix RC Opt-In Stretch Code

- Residential Buildings and dwelling units covered by this chapter may elect to comply with the requirements of IECC Appendix RC and R404 as amended.

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Energy Rating Index

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What is an Energy Rating Index in Massachusetts?

R406.4 Energy Rating Index

- The Energy Rating Index (ERI) shall be the RESNET certified HERS index determined in accordance with RESNET/ICC 301-2019 (or most recent version).
- Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the building site shall not be included in the ERI reference design or the rated design.

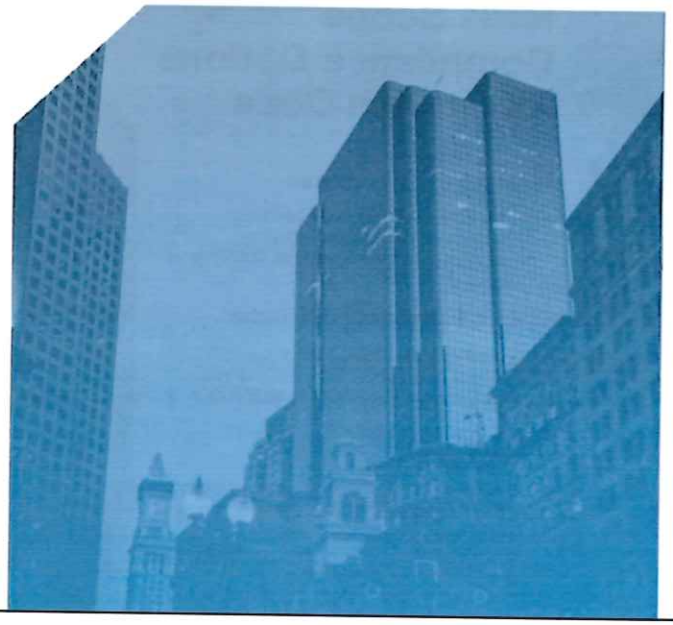

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Table R406.5 Maximum Energy Rating Index

Clean Energy Application	New Construction Starts January 1, 2023, until June 30, 2024	New Construction After July 1, 2024	Major Alterations, Additions, and Changes, of use Starts January 1, 2023
Mixed-Fuel Building	52	42	52
Solar Electric Generation*	55	42	55
All-Electric Building	55	45	55
Solar Electric* and All-Electric Building	58	45	58

***Solar Electric Generation** = Solar photovoltaic array rated at 4kW or higher

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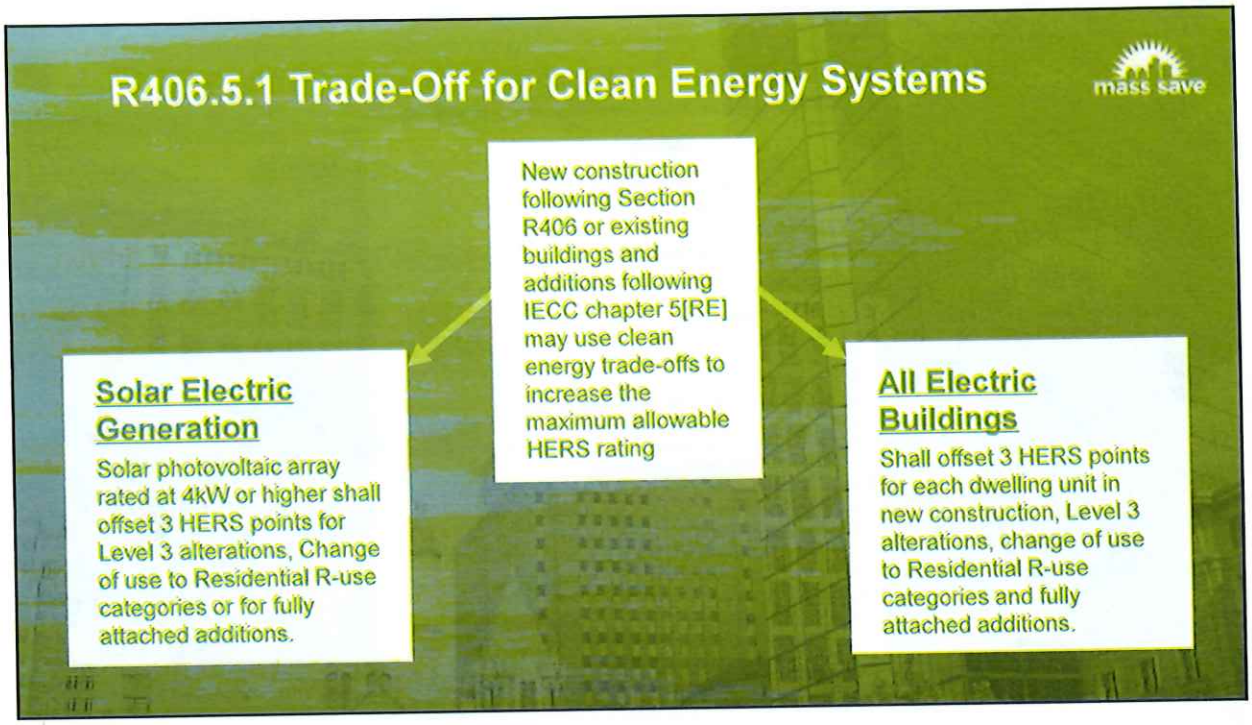

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Table R406.5 Requirements for ERI

Building thermal envelope shall be ≥ the levels of efficiency and SHGC in Table 402.1.2 or Table R402.1.4 of the ***2015*** *International Energy Conservation code.*

2015 IECC Table 402.1.2	
Component	Insulation value
Ceilings	R-49
Wood Frame Walls	R-20 or 13+5
Mass Walls	R-13/17
Floors	R-30
Basement Walls	R-15/19
Unvented Crawl Space Walls	R-15/19
Slabs	R-10, 2 ft
Windows and doors	U-0.32

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Table 406.2 Requirements – Energy Rating Index

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Formerly Listed as Mandatory Requirements

Now in One Table

Section	Title
	General
R401.3	Certificate
	Building Thermal Envelope
R402.1.1	Vapor retarder
R402.2.3	Eave Baffle
R402.2.4.1	Access hatches and doors
R402.2.10.1	Crawl space wall insulation installation
R402.4.1.1	Installation
R402.4.1.2	Testing
	Mechanical
R403.1	Controls
R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6)
R403.4	Mechanical system piping insulation
R403.5.1	Heated water circulation and temperature maintenance systems
R403.5.3	Drain water heat recovery units
R403.6.1	**Heat or energy recovery ventilation (HRV/ERV)**
R403.7	Equipment sizing and efficiency rating
R403.8	System serving multiple dwelling units
R403.9	Snow and ice melt systems
R403.10	Energy consumption of pools and spas
R403.11	Portable spas
R403.12	Residential pools and permanent residential spas
	Electrical Power and Lighting Systems
R404.1	Lighting equipment

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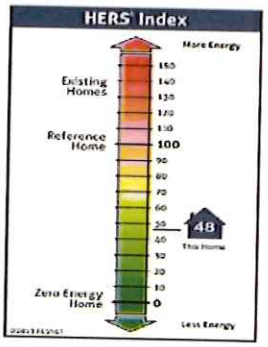
Verification by an Approved Agency

Energy Rating Index Method



ENERGY STAR Homes certification is no longer a compliance option

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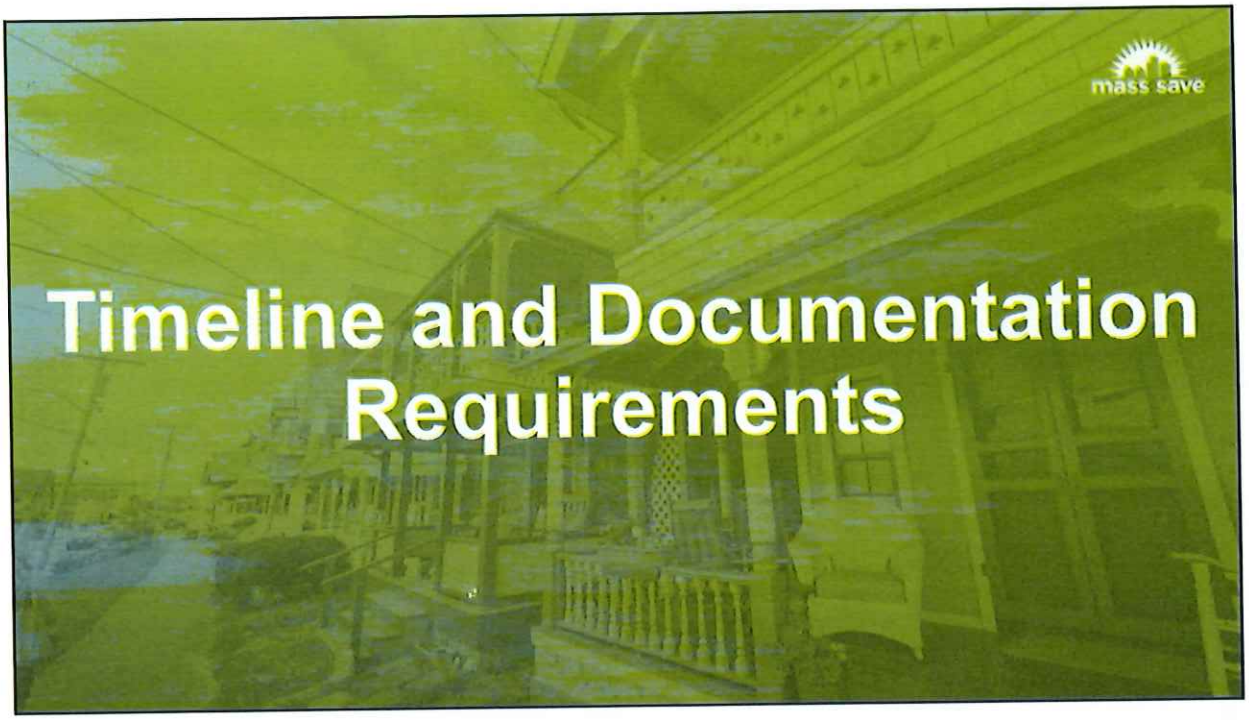
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Timeline and Documentation Requirements

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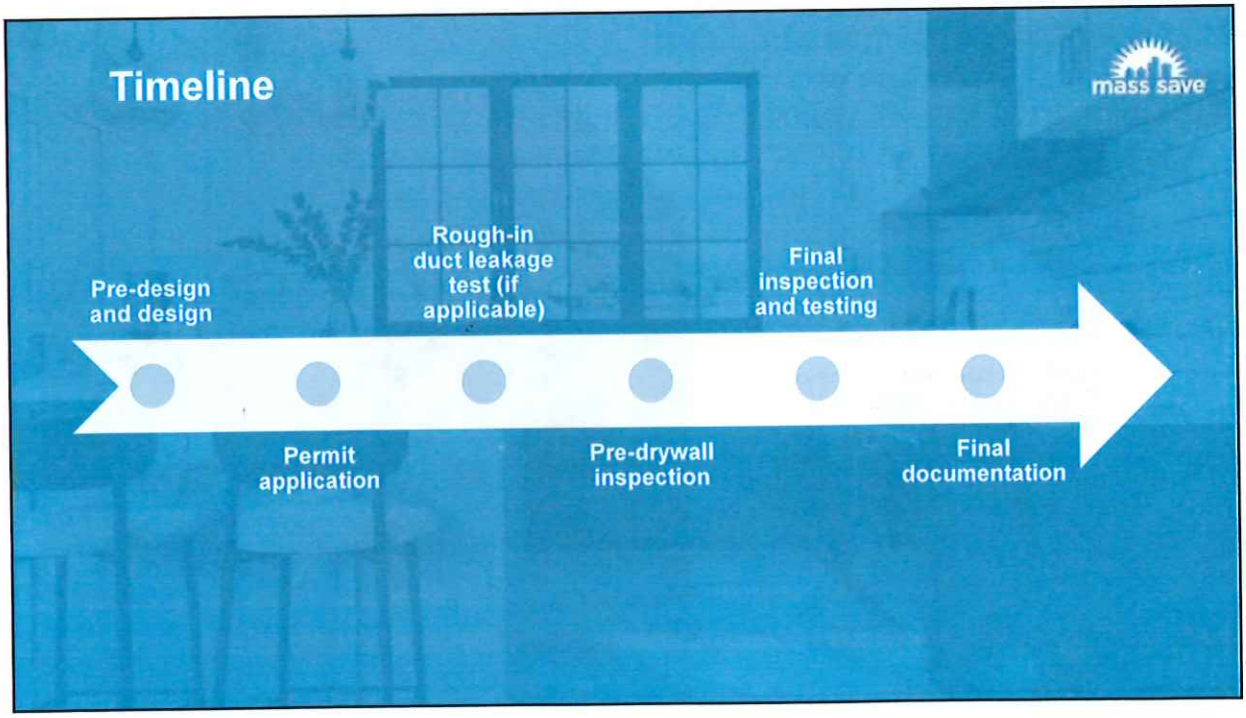
Timeline
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Pre-design and design
Permit application
Rough-in duct leakage test (if applicable)
Pre-drywall inspection
Final inspection and testing
Final documentation

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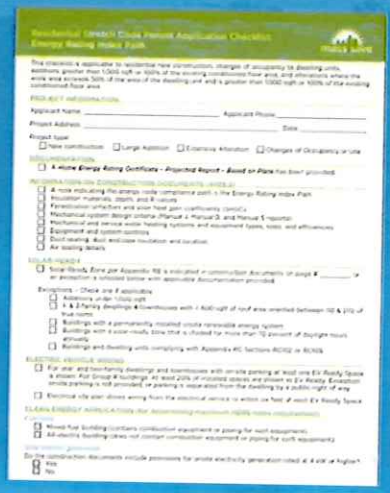
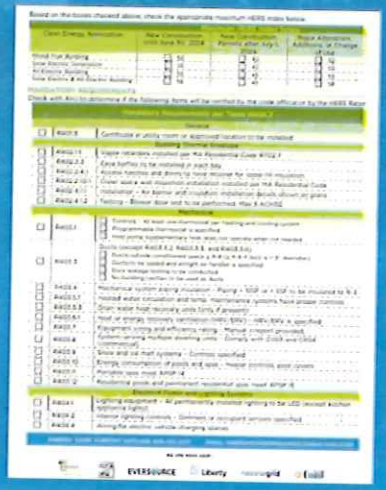
Pre-Design and Design

- Make sure the local building departments and builders in your service territory know about the stretch code
- Provide them with the permit application/plan submittal checklist
- Mass Save did a mailing to all code offices 10/2023 and plan to do more





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Compliance Software Tools

- Approved Rating Software Tools in accordance with RESNET/ICC 301
- Inputs not specified by Envelope, Systems, and Lighting, are taken from RESNET/ICC 301
  - This does not apply if you're doing a HERS Rating (all inputs come from RESNET/ICC 301)

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R406.7.2.1 Documentation for Permit Application

Energy Rating Index

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Prior to the issuance of a building permit:

1. A HERS compliance report which includes a HERS index score of 52* or lower, or otherwise complies via renewable trade-offs
2. A document of building component energy specifications
3. A statement that the rating index score is "based on plans"

*Or HERS 42 for permits after July 1, 2024

Home Energy Rating Certificate
Projected Report
Based on Plans

Rating Date: 2023-01-26
Registry ID:
Ekotrope ID: yL0b3n8v

HERS® Index Score: 52 — Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings $602 *Relative to an average U.S. home

Home: 22 16th Street, Newbury, MA 01951
Builder: Daly Construction

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	28.9	$165
Cooling	1.3	$30
Hot Water	10.0	$50
Lights/Appliances	15.9	$373
Service Charges		$120
Generation (e.g. Solar)	0.0	$0
Total:	56.1	$737

This home meets or exceeds the criteria of the following:
2021 International Energy Conservation Code
2018 International Energy Conservation Code

Home Feature Summary:

Rating Completed by:

ekotrope

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Documentation for Permit Application

Energy Rating Index

Home Energy Rating Certificate
Projected Report
Based on Plans

Rating Date: 2023-01-26
Registry ID:
Ekotrope ID: yL0b3n8v

HERS® Index Score: 52 — Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings $602 *Relative to an average U.S. home

Home: 22 16th Street, Newbury, MA 01951
Builder: Daly Construction

ekotrope

Ekotrope RATER - Version:4.0.0.3100
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Home Feature Summary:

Home Type:	Single family detached
Model:	N/A
Community:	N/A
Conditioned Floor Area:	1,311 ft²
Number of Bedrooms:	3
Primary Heating System:	Furnace • Natural Gas • 96.1 AFUE
Primary Cooling System:	Air Conditioner • Electric • 14 SEER
Primary Water Heating:	Residential Water Heater • Natural Gas • 0.93 UEF
House Tightness:	2.25 ACH50
Ventilation:	70 CFM • 24 Watts
Duct Leakage to Outside:	5 CFM @ 25Pa (0.38 / 100 ft²)
Above Grade Walls:	R-34
Ceiling:	Vaulted Roof, R-62
Window Type:	U-Value: 0.28, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-48

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	28.9	$165
Cooling	1.3	$30
Hot Water	10.0	$50
Lights/Appliances	15.9	$373
Service Charges		$120
Generation (e.g. Solar)	0.0	$0
Total:	56.1	$737

R406.7.2.1

This home meets or exceeds the criteria of the following:
2021 International Energy Conservation Code
2018 International Energy Conservation Code

Rating Completed by:

Energy Rater: Alex Pukatar
RESNET ID: 8610280
Rating Company: The Pukatar Group, LLC
120 Dufresne Drive
518-874-1804
Rating Provider: Performance Systems Development
950 Danby Rd, Ste 207P, Ithaca NY 14850
607-277-6240

Alex Pukatar, Certified Energy Rater
Date: 2/20/23 at 2:33 PM

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Pre-Drywall Inspection

R402.4.1.1 Air Barrier and Insulation Installation Criteria

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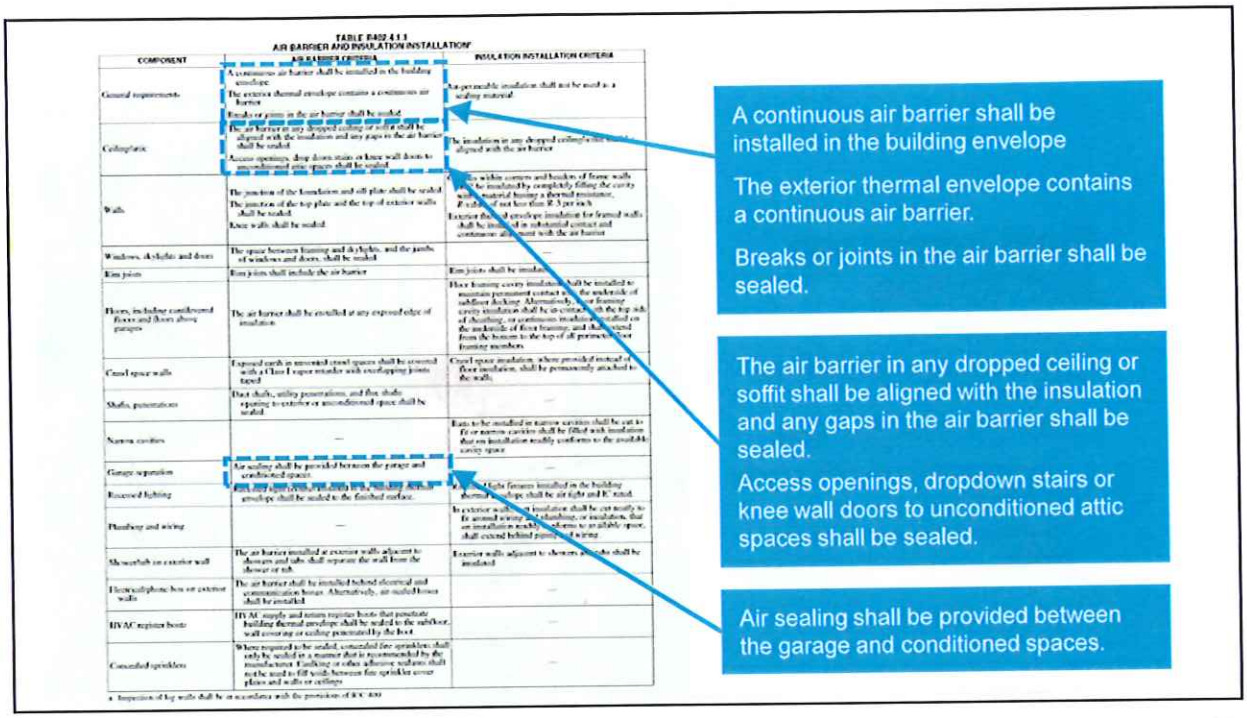
Pre-Drywall Inspection

In addition to HERS minimum rated features…

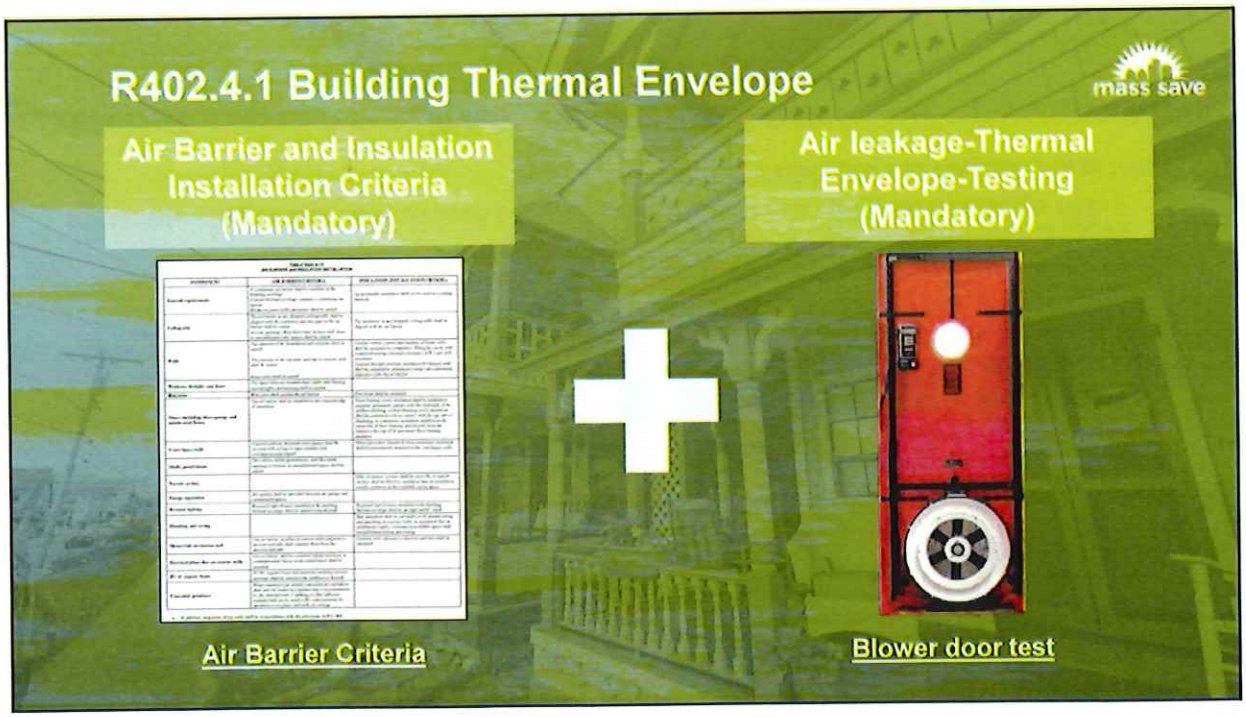
Table R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance, R-value, of not less than R-3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between framing and skylights, and the jambs of windows and doors, shall be sealed.	
Rim joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors, including cantilevered floors and floors above garages	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking. Alternatively, floor framing cavity insulation shall be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing, and shall extend from the bottom to the top of all perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	Crawl space insulation, where provided instead of floor insulation, shall be permanently attached to the walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	
Narrow cavities	—	Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.
Garage separation	An air sealing shall be provided between the garage and conditioned spaces.	—
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring		In exterior walls, batt insulation shall be cut neatly to fit around wiring and plumbing, or insulation, that on installation readily conforms to available space, shall extend behind piping and wiring.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.	Exterior walls adjacent to showers and tubs shall be insulated.

33


A continuous air barrier shall be installed in the building envelope
The exterior thermal envelope contains a continuous air barrier.
Breaks or joints in the air barrier shall be sealed.
The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.
Access openings, dropdown stairs or knee wall doors to unconditioned attic spaces shall be sealed.
Air sealing shall be provided between the garage and conditioned spaces.

34


R402.4.1 Building Thermal Envelope
mass save
Air Barrier and Insulation Installation Criteria (Mandatory)
Air leakage-Thermal Envelope-Testing (Mandatory)
Air Barrier Criteria
Blower door test

35

Final Inspection and Testing

- Blower door test
- Post-construction duct leakage test (if applicable)
- HRV/ERV system flow testing
- Final inspection and HERS Rating data collection
- Provide documentation to the builder

36

MA Residential Amendments
ERI Documentation – Final

Prior to the issuance of a <u>certificate of occupancy</u>:

1. A **copy of the final certificate** indicating that the HERS rating index score for each unit is verified to be 52* or less or otherwise complies via renewable trade-offs
2. A **copy of the certificate**, as required by Section R401.3 for each unit listing the final HERS index score of the dwelling unit


Home Energy Rating Certificate
Projected Report
HERS® Index Score: 52
Annual Savings $602
Your Home's Estimated Energy Use:
This home meets or exceeds the criteria of the following:
Rating Completed by:
Home Feature Summary:
elotrope


Energy Code Compliance Certificate
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Energy Code Edition
Compliance Path
Building Thermal Envelope
Ceiling R-Value
Roof R-Value
Wall R-Value
Slab R-Value
Basement Wall R-Value
Crawl Wall R-Value
Floor R-Value
Window U-Factor
Window SHGC
Air Infiltration Rate
Mechanical Systems
Duct R-Value
Duct Leakage Rate
Heating Equip Eff
Cooling Equip Eff
Photovoltaic System
Capacity
Inverter Eff
Panel Tilt
Panel Orientation
Energy Rating Index
With Onsite Power
W/O Onsite Power
Address:
Date:
Builder or Design Professional Signature:

37

Additional Documentation

Whole-house Mechanical Ventilation Design Worksheet

Energy Code Inspection Checklist from REM/Rate or Ekotrope

Duct, Envelope, and Ventilation Testing Report

Air Barrier and Insulation Installation Criteria Checklist

39

ERI Provisions

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ERI Requirements Overview

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Table R406.5
Maximum HERS Index

Clean Energy Application	New Construction Permits January 1, 2023, through June 30, 2024	New Construction Permits Starting July 1, 2024
Mixed-Fuel Building	52	42
Solar Electric Generation*	55	42
All-Electric Building†	55	45
Solar Electric* and All-Electric Building†	58	45

*Solar Electric Generation = Solar photovoltaic array rated at 4kW or higher
†Buildings electing to be all-electric and utilizing trade-offs for clean energy systems per R406.5.1 to achieve an increase in maximum HERS Index, must meet the efficiencies of R408.2.2 and R408.2.3 for primary heating and domestic hot water equipment.

Table R406.2
Requirements for Energy Rating Index

General	
R401.3	Certificate
Building Thermal Envelope	
R402.1.1	Vapor retarder
R402.2.3	Eave Baffle
R402.2.4.1	Access hatches and doors
R402.2.10.1	Crawl space wall insulation installation
R402.4.1.1	Installation
R402.4.1.2	Testing
Mechanical	
R403.1	Controls
R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6)
R403.4	Mechanical system piping insulation
R403.5.1	Heated water circulation and temperature maintenance systems
R403.5.3	Drain water heat recovery units
R403.6.1	Heat or energy recovery ventilation (HRV/ERV)
R403.7	Equipment sizing and efficiency rating
R403.8	System serving multiple dwelling units
R403.9	Snow and ice melt systems
R403.10	Energy consumption of pools and spas
R403.11	Portable spas
R403.12	Residential pools and permanent residential spas
Electrical Power and Lighting Systems	
R404.1	Lighting equipment
R404.2	Interior lighting controls
R404.4	Wiring for electric vehicle charging spaces

41

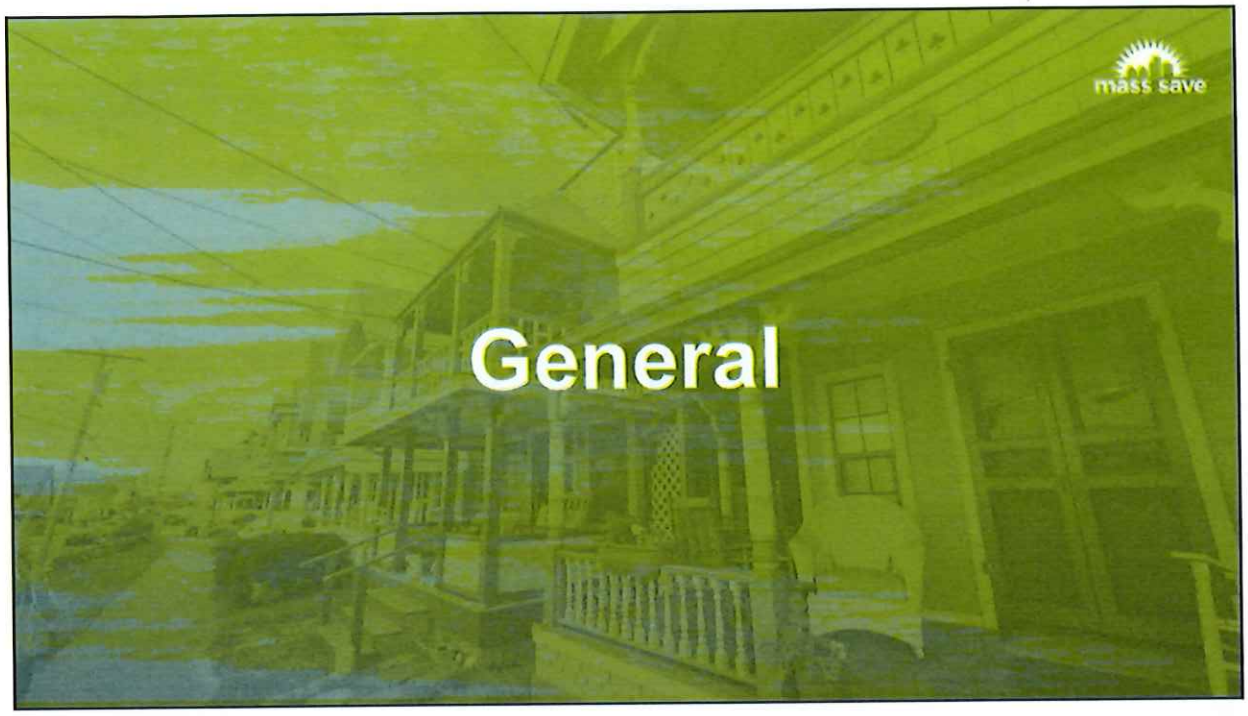
Discussion

Whose responsibility is it to verify the requirements of Table R406.2?

Building Inspectors?

HERS Raters?

42



43

R103.1 – Item 10: EV Ready Zone

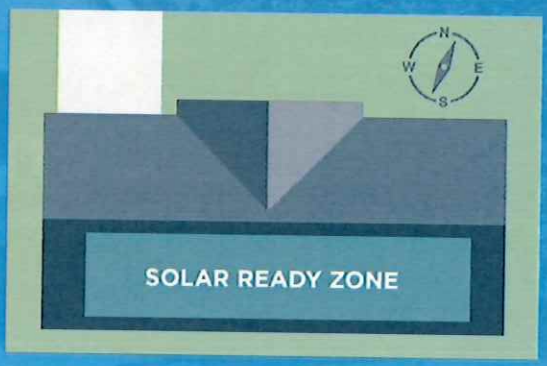
EV Ready Space locations per R404.4

Construction documents shall identify the total service load required to serve the residential unit

44

R103.1 – Item 11: Solar-Ready Zone

- Applicable if home meets the following criteria
  - Is new construction (except additions)
  - Is a 1- or 2-family dwelling or townhouse
  - Has 600 ft² of roof/overhang facing between 110° and 270° of true north
- Zone must be:
  - At least 300 ft²
  - Clear of obstructions
- Structural design loads clearly indicated on construction documents
- Conduit or plumbing pathway shown on plans
- Permanent certificate indicating the solar-ready zone and other solar-ready requirements



45

R401.3 Certific

The 2021 IECC requires additional items to be listed the certificate that is to be posted in the furnace or uti room including:

- Photovoltaic system information (if applicable
- Energy Rating Index sc with and without on-site generation) if applicable
- The energy code edition and compliance path used

Energy Code Compliance Certificate

Energy Code Edition		Compliance Path	
Building Thermal Envelope		Mechanical Systems	
Ceiling R-Value:		Duct R-Value:	
Roof R-Value:		Duct Leakage Rate:	
Wall R-Value:		Heating Equip Eff:	
Slab R-Value:		Cooling Equip Eff:	
Basement Wall R-Value:			
Crawl Wall R-Value:		Photovoltaic System	
Floor R-Value:		Capacity:	
Window U-Factor:		Inverter Eff:	
Window SHGC:		Panel Tilt:	
Air Infiltration Rate:		Panel Orientation:	
Energy Rating Index			
With Onsite Power:		W/O Onsite Power:	

Address: _____ **Date:** _____

Builder or Design Professional Signature: _____

THIS LABEL MUST BE PERMANENTLY AFFIXED BY HOME BUILDERS TO THE BREAKER PANEL ON ALL NEW RESIDENTIAL BUILDINGS

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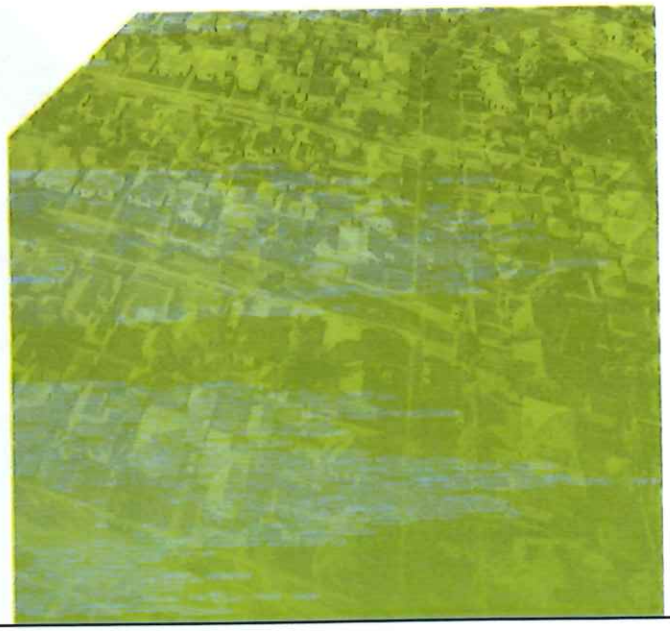
Building Thermal Envelope

47

R402.4 Air Leakage (and Insulation Installation)

Air leakage and insulation installation requirements under the stretch code:

- Air Barrier and Insulation Installation Criteria (IECC R402.4.1)
- Blower door test
  - ≤ 5 ACH50
  - Multifamily testing options (or lack thereof)
  - Passive House requirements (for Passive House path only)
- Insulation shall be Grade I (MA R402.4.1.1)



48

Air Barrier Installation Criteria

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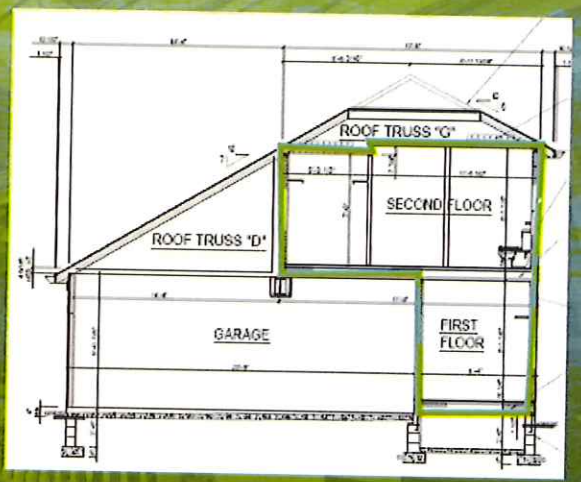
IECC Table R402.4.1.1

General requirements

A continuous air barrier shall be installed in the building envelope.

The exterior thermal envelope contains a continuous air barrier.

Breaks or joints in the air barrier shall be sealed



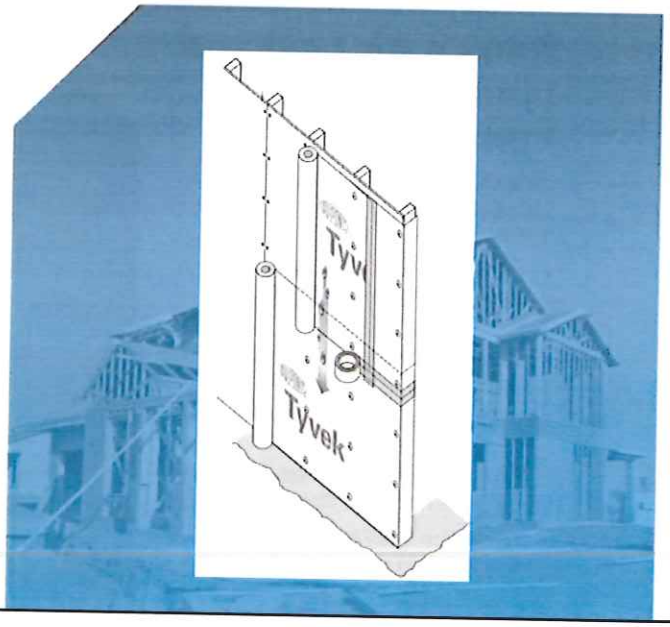
49

Common Air Barrier Strategies

- House wrap with attention to details
- Sheathing w/ self-adhered membrane & tape
- Drywall sealed to framing
- Sheathing (OSB, plywood, foam) sealed at joints
- Spray foam

Combined with caulk, foam sealant, liquid air barriers

These are NOT necessarily complete air barrier systems by themselves.

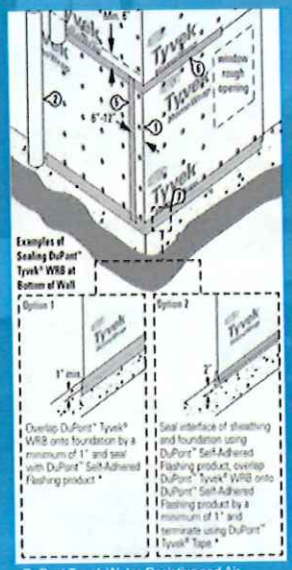


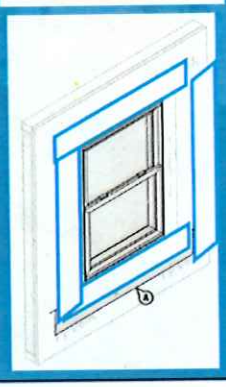
50

House Wrap Installation

Installation as an air barrier:

1. Install shingle-fashion (start at the bottom)
2. Fasten with broad crown staples (or equiv.)
3. Clean surface of debris before taping
4. Tape all seams – vertical AND horizontal
5. Overlap house wrap onto foundation
6. Seal wrap to foundation
7. Flash/seal all penetrations





DuPont Tyvek Water-Resistive and Air Barrier Installation Guidelines

51

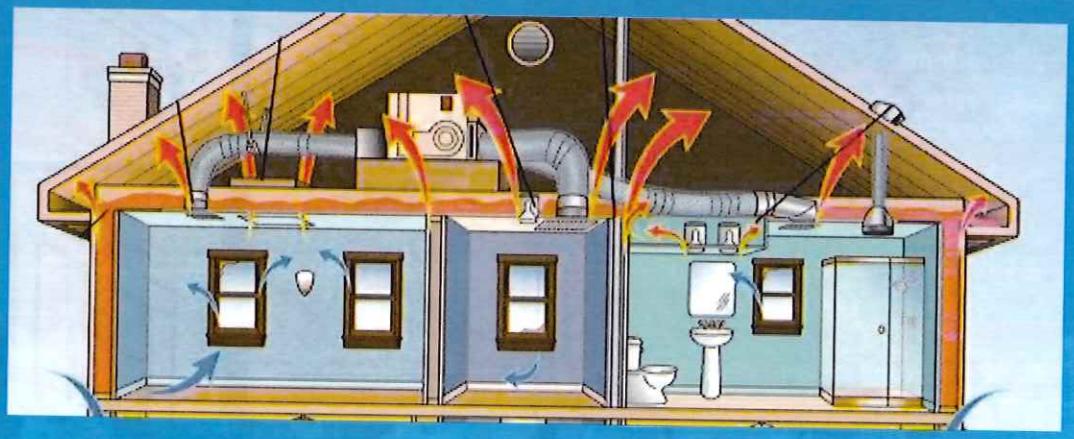
Self-Adhered Membrane

WRB as air barrier, is only part of a complete air barrier

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

52

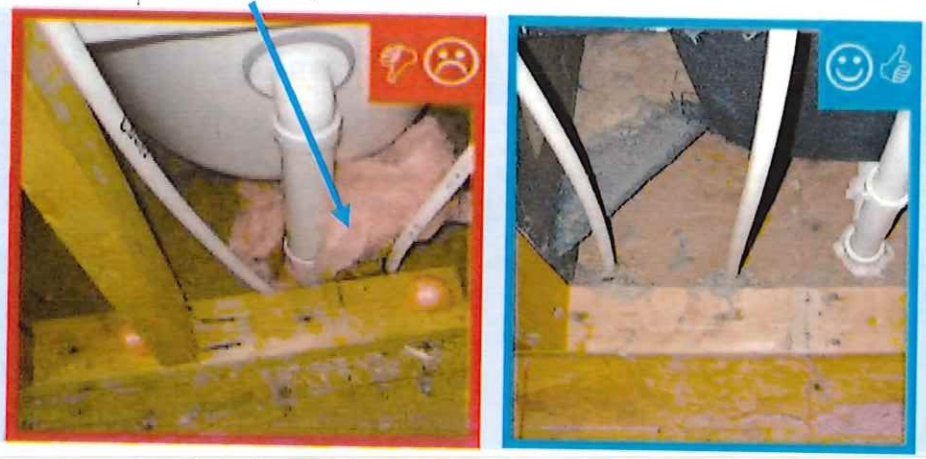
General Requirements – Continuous Air Barrier



53

General Requirements – Air Permeable Insulation

Not used as a sealing material



Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

54

Pre-Drywall/Midpoint Inspection Checklist

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Massachusetts Energy Code 10th Edition

Air Barrier and Insulation Checklist (Based on IECC 2021 Table R402.4.1.1)

FRAMING INSPECTION		
☐	Ceiling/attic	• The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.
☐	Walls	• The junction of the foundation and sill plate shall be sealed. • The junction of the top plate and the top of exterior walls shall be sealed. • Knee walls shall be sealed. • Walls are framed to allow the corner to be insulated or continuous insulation is/will be installed.
☐	Windows, skylights and doors	• The space between window/door jambs and framing, and skylights and framing shall be sealed.
☐	Rim joists	• Rim joists shall include the air barrier.
☐	Floors (including above garage and cantilevered floors)	• The air barrier shall be installed at any exposed edge of insulation.
☐	Crawl space walls	• Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
☐	Garage separation	• Air sealing shall be provided between the garage and conditioned spaces.
☐	Shower/tub on exterior wall	• Exterior walls adjacent to showers and tubs shall be insulated • The air barrier installed at exterior walls adjacent showers and tubs shall separate them from the showers and tubs.
☐	Electrical/phone box on exterior walls	• The air barrier shall be installed behind electrical or communication boxes or air-sealed boxes shall be installed.
☐	Concealed sprinklers	• When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

55

Pre-Drywall/Midpoint Inspection – Ceiling/Attic Plane

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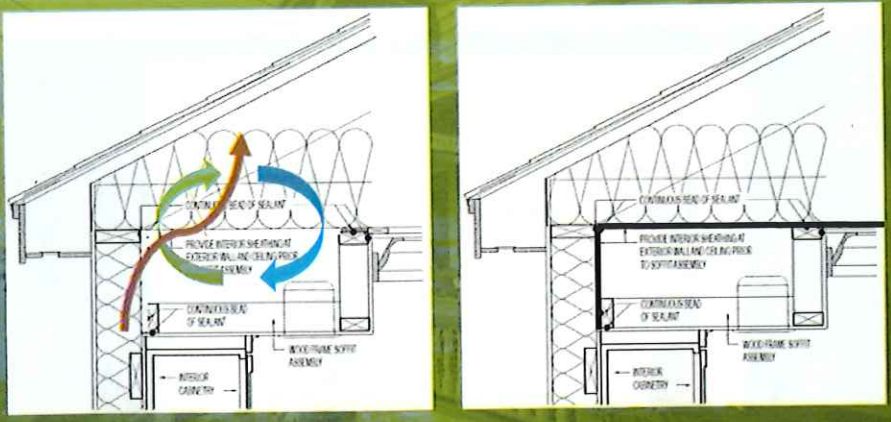
☐	Ceiling/attic	• The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.



CAD details Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

56

Pre-Drywall/Midpoint Inspection
Ceiling/Attic – Soffit Spaces

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

57

Pre-Drywall/Midpoint Inspection
Walls – Air Barrier Options

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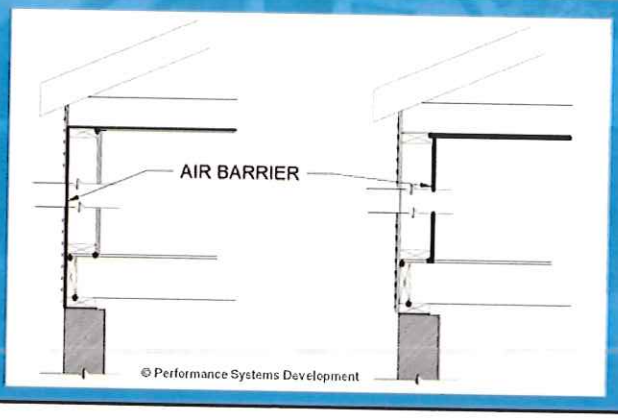
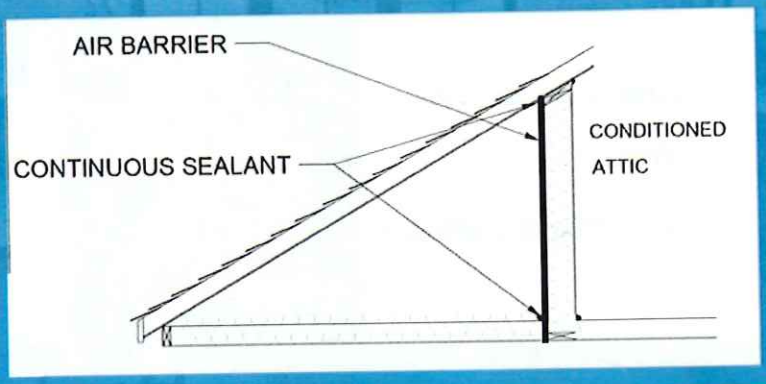
☐	Walls	• The junction of the foundation and sill plate shall be sealed. • The junction of the top plate and the top of exterior walls shall be sealed. • Knee walls shall be sealed. • Walls are framed to allow the corner to be insulated or continuous insulation is/will be installed.



58

Pre-Drywall/Midpoint Inspection
Walls – Air Barrier Options

☐	Walls	• The junction of the foundation and sill plate shall be sealed. • The junction of the top plate and the top of exterior walls shall be sealed. • Knee walls shall be sealed. • Walls are framed to allow the corner to be insulated or continuous insulation is/will be installed.



59

Pre-Drywall/Midpoint Inspection
Knee Walls

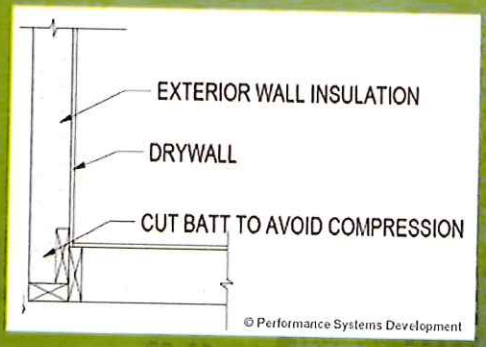
Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

60

Pre-Drywall/Midpoint Inspection
Walls – Insulated Corner

mass save

☐	Walls	• The junction of the foundation and sill plate shall be sealed. • The junction of the top plate and the top of exterior walls shall be sealed. • Knee walls shall be sealed. • Walls are framed to allow the corner to be insulated or continuous insulation is/will be installed.



Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

61

Pre-Drywall/Midpoint Inspection
Windows & Doors

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☐	Windows, skylights and doors	• The space between window/door jambs and framing, and skylights and framing shall be sealed.

62

Pre-Drywall/Midpoint Inspection
Rim Joists

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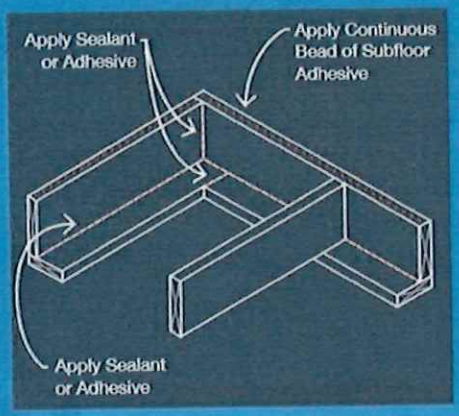
☐	Rim joists	• Rim joists shall include the air barrier.



Priority Air Sealing Locations for New Homes, Insulation Institute.

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

63

Pre-Drywall/Midpoint Inspection
Garage Separation

mass save

☐	Floors (including above garage and cantilevered floors)	• The air barrier shall be installed at any exposed edge of insulation.

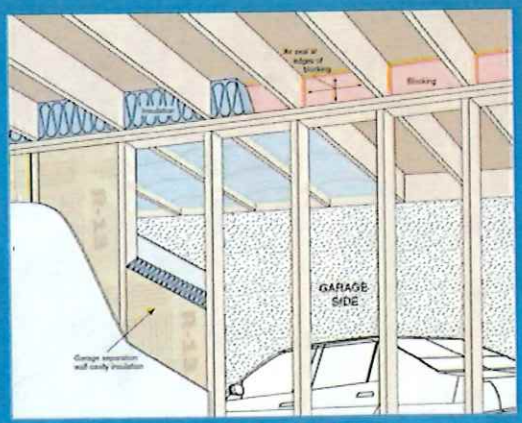


Image courtesy of Southface – southface.org

Source: energy.gov

64

Pre-Drywall/Midpoint Inspection
Shower/Tub on Exterior Wall

mass save

☐	Shower/tub on exterior wall	• Exterior walls adjacent to showers and tubs shall be insulated • The air barrier installed at exterior walls adjacent showers and tubs shall separate them from the showers and tubs.

65

Pre-Drywall/Midpoint Inspection
Electrical/Phone Boxes on Exterior Wall

mass save

☐	Electrical/phone box on exterior walls	• The air barrier shall be installed behind electrical or communication boxes or air-sealed boxes shall be installed.

66

Insulation Installation Criteria – General

- All insulation shall be installed at Grade I quality in accordance with ICC/RESNET 301.
- 1.3 All insulation achieves Grade I install. per ANSI/RESNET/ICC Std. 301. Alternatives in Footnote 5. [5,6]

Grade I – Minor Defects

Occasional very small gaps are allowed. Voids can't extend from the interior to the exterior (i.e. the full width of a wall cavity). The product is installed according to manufacturer's specification and cut to fit around electrical junction boxes and is split around wires and pipes. Compression or incomplete fill amounting to 2% or less, if the empty spaces are less than 30% of the intended fill thickness, are acceptable for Grade I.

RESNET protocol for the effect of missing insulation on installation grade

RESNET protocol for the effect of missing insulation on installation grade
Diagrams from the HERS Standards

67

68

Eave Baffles (R402.2.3)

New for 2021

Requires the eave baffles to be installed at the outer edge of the exterior wall top plate to provide maximum space for insulation above the top plate. Must be installed continuously even if soffit venting is not, to ensure air moves past.

69

Access Hatches and Doors

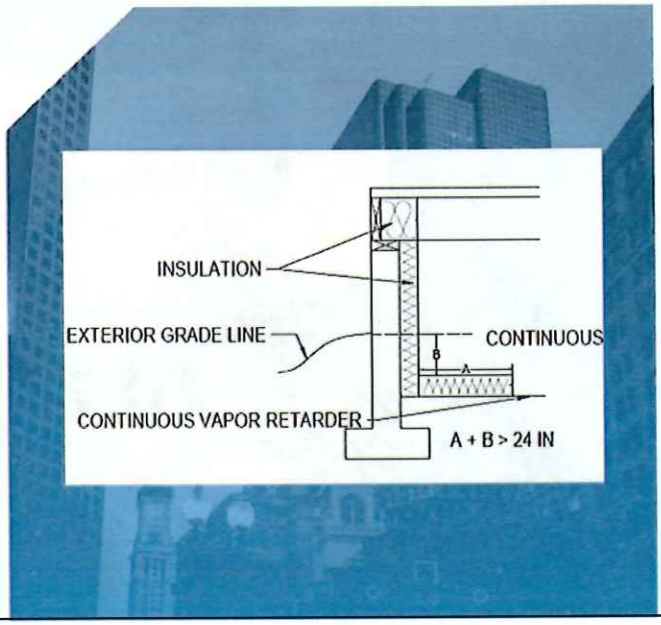
R402.2.4.1 Access hatches and door insulation installation and retention

- Access hatches and doors are weather-stripped
- Access to equipment that prevents damaging or compressing the insulation
- Baffle to prevent loose-fill insulation from spilling
  - Into the living space
  - From higher to lower sections of the attic
  - From attics covering conditioned spaces to unconditioned spaces
- Baffle permanently maintains the installed R-value of loose-fill insulation

70

R402.2.10.1 Crawl Space Wall Insulation Installation

- Insulation is permanently fastened to the wall
- Extends downward from the floor to finished grade and then vertically or horizontally and additional 24 inches
- Exposed earth is covered with a continuous Class I vapor retarder
  - Lapped 6 inches
  - Extends up walls 6 inches



71

Insulation Installation

Walls per Manufacturer's Instructions

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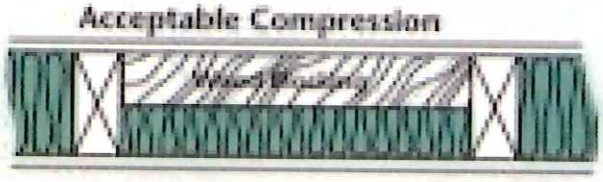
72

Insulation Installation
Walls – Poor Installation

73

Insulation Installation – Walls



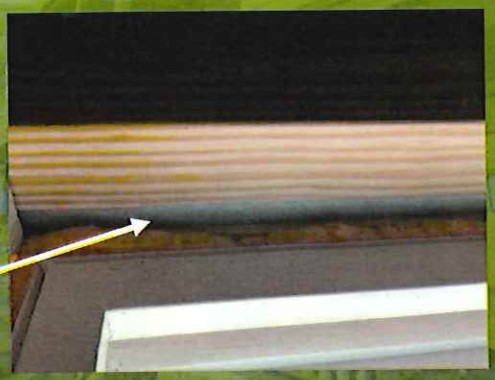
insulationinstitute.org

Plan View

74

Insulation Installation
Walls

☐	Walls	• Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. • Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.



75

Insulation Installation
Rim Joists

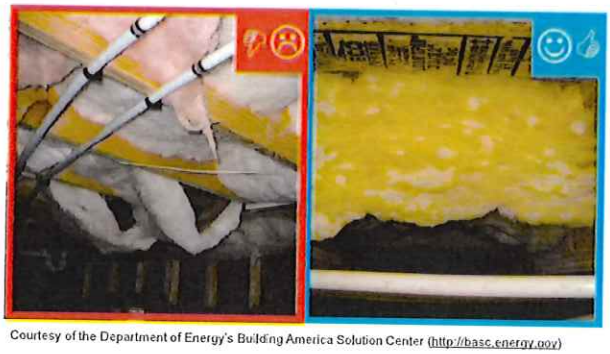
☐	Rim joists	• Rim joists shall be insulated.

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

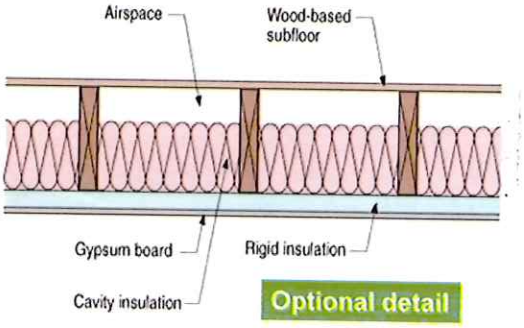
76

Insulation Installation – Floors

☐	Floors (including above garage and cantilevered floors)	• Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking, or floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extends from the bottom to the top of all perimeter floor framing members.



Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)



77

Insulation Installation
Narrow Cavities

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☐	Narrow cavities	• Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.

78

Insulation Installation
Recessed Lighting

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☐	Recessed lighting	• Recessed lighting fixtures installed in the building thermal envelope shall be air tight and IC rated.

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

© Performance Systems Development

79

Plumbing Rough-In Inspection
Plumbing and Wiring

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☐	Plumbing and wiring	• Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.

© Performance Systems Development

© Performance Systems Development

80

Mechanical Inspection
Shafts & Penetrations

mass save

☐	Shafts, penetrations	• Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.

81

Mechanical Inspection
HVAC Register Boots

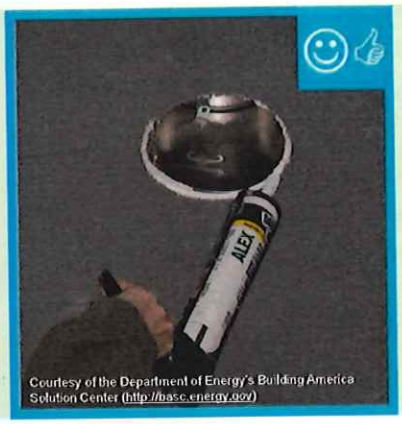
mass save

☐	HVAC register boots	• HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering, or ceiling penetration.

82

Final Inspection – Recessed Lighting

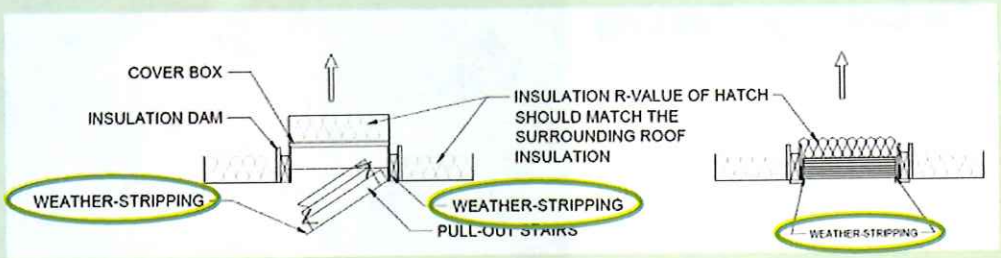
☐	**Recessed lighting**	• Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.



83

Final Inspection – Attic Access Hatch

☐	**Ceiling/Attic**	• Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.



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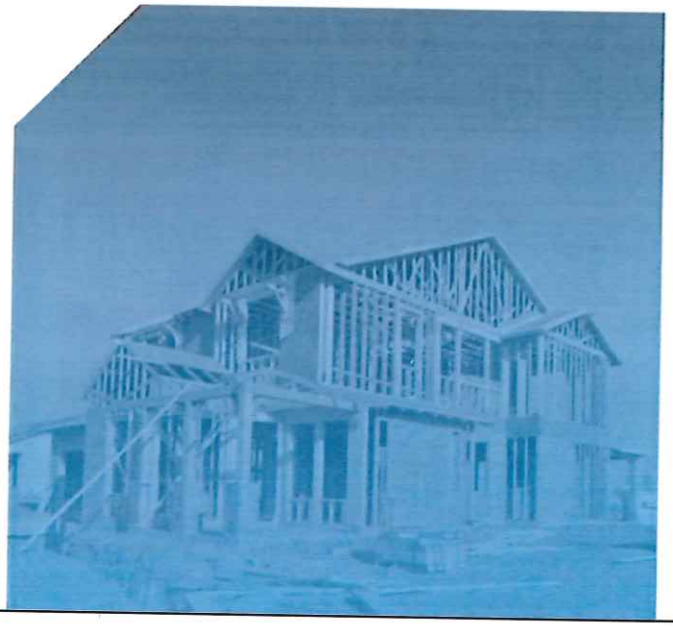
84

Summary

Air barriers:

- Eliminate energy waste from uncontrolled infiltration
- Protect insulation from R-value degradation
- Reduce condensation risk
- Improve indoor air quality

Download and use the checklist!



85

Air Leakage Testing

- Max ACH50 for Prescriptive Option
  - CZ 5 = 3.0
- Energy Rating Index (ERI) Option
  - Max ACH50 for all CZs = 5.0

86

Air Leakage Testing

Air leakage per square foot of enclosure area may be used in lieu of ACH50 for:

- Attached single- and multiple-family building dwelling units
- Buildings or dwelling units ≤ 1,500 square feet

Maximum leakage rate = 0.30 cfm per sf

DWELLING UNIT ENCLOSURE AREA. The sum of the area of ceilings, floors, and walls separating a dwelling unit's conditioned space from the exterior or from adjacent conditioned or unconditioned spaces. Wall height shall be measured from the finished floor of the dwelling unit to the underside of the floor above.

87

Blower Door Testing Standards

- The energy code requires RESNET/ICC 380, ASTM E779, or ASTM E1827
- All three set national standards for testing a building through fan pressurization or depressurization.
  - ANSI/RESNET/ICC 380 Standard for Testing of Airtightness of Building, Dwelling Unit, and Sleeping Unit Enclosures…
  - ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
    - Requires multipoint testing and both pressurization and depressurization testing
  - ASTM E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

Required by RESNET/ICC 301-2019

88

Multifamily Air Leakage Testing

Whole-building or individual unit testing?

- The energy code says that the building or dwelling unit shall be tested
- RESNET 380-2019 does not contain provisions for whole-building testing
- Therefore, each dwelling unit must be tested

Compartmentalization or guarded testing?

- RESNET 380-2019 does not allow guarded testing

4.3.2.1. Pressures shall be induced only via a Blower Door (or Blower Doors) attached to the subject Dwelling Unit. Pressures shall not be induced through the use of Blower Doors attached to spaces adjacent to the subject Dwelling Unit.

89

Mechanical Systems

90

Controls (R403.1)

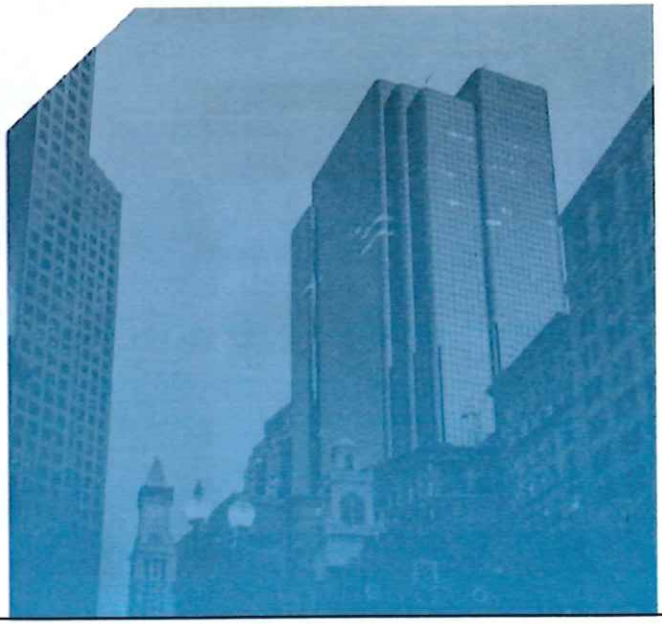
- No changes from 2018 IECC
- The thermostat controlling the primary heating and cooling system of the dwelling shall:
  - Be capable of a daily schedule and maintain different temperature set points
  - Capable to set back or temporarily operate the system to maintain zone temperatures of not ≤ 55˚ and not ≥ 85˚
  - Initial manufacturing programming heating set point of not ≥ 70˚ and cooling setpoint of not ≤ 78˚

91

Duct Sealing and the IRC

IRC M1601
Joints, longitudinal and transverse seams, and connections in ductwork **shall be securely fastened and sealed** with:

- Welds
- Gaskets
- Mastics
- Mastic-plus-embedded-fabric systems
- Liquid sealants
- Tapes



92

Duct Sealing and the IECC

R403.3.5 Duct Testing (Mandatory)*

Ducts shall be pressure tested to determine air leakage

R403.3.6 Duct Leakage (Prescriptive)

2021 IECC Duct Leakage Requirement	
Type of Test	Maximum Leakage Rate
Rough-in test with air-handler	4 CFM/ 100 sq ft
Rough-in test without air handler	3 CFM/ 100 sq ft
Post-construction total leakage to outside	4 CFM/ 100 sq ft
Post Construction Duct System and air handler 100% Conditioned space	8 CFM/ 100 sq ft

*Exceptions:

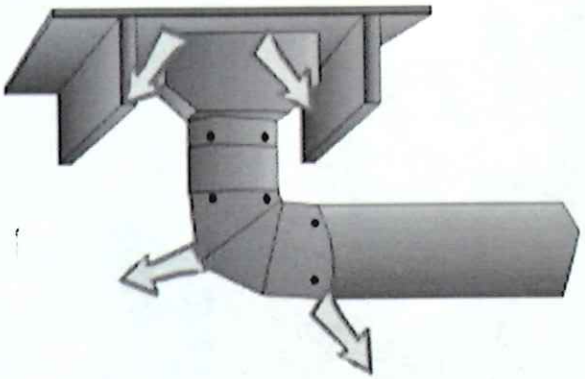
1. Not required for ducts servicing ERVs & HRVs that are not integrated w/ducts serving heating or cooling systems

95

Duct Sealing – Elbows and Joints

96

Duct Sealing – Register Boots



Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

97

Duct Sealing – Take-off Connections

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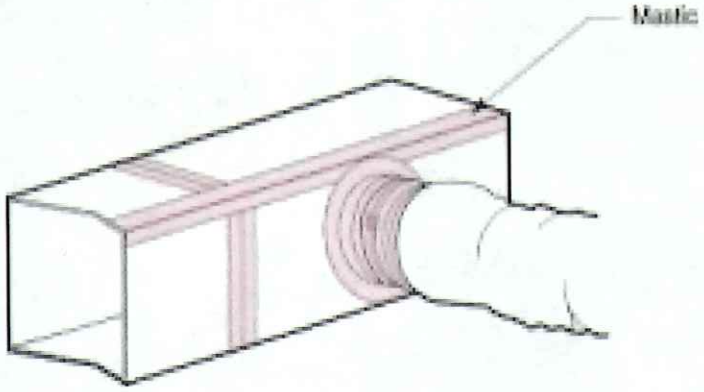
Flex Take-Off from Rigid



98

Duct Sealing – Metallic Duct

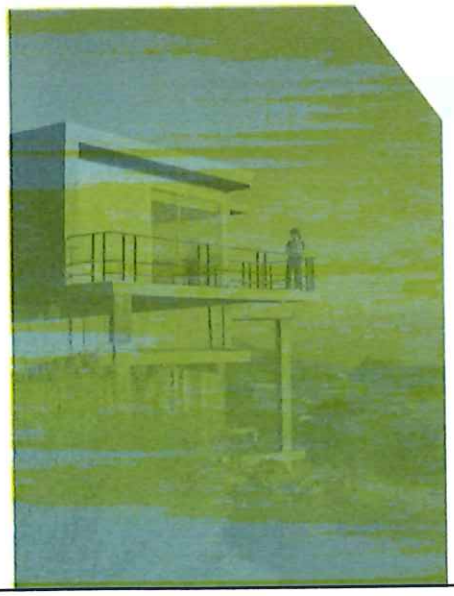
99

Duct Sealing – Air Handlers & Filter Boxes

102

R403.3.4.1 Air Handlers

103



Duct Leakage Testing

Duct leakage testing is required ***regardless*** of duct and air handler location

- No exceptions for systems entirely within the thermal envelope

Testing standards added

- ANSI/RESNET/ICC 380 or
- ASTM E1554

Prescriptive leakage limits

- 4 cfm/100 sf with air handler installed
- 3 cfm/100 sf without air handler installed
- 8 cfm/100 sf when entire system is inside

Limits do not apply to Total Building Performance or ERI paths

104

Ducts Located in Conditioned Space R403.3.2 – NEW

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For buried ducts to be considered inside conditioned space:

Buried ducts complying with all of the following conditions:

- *Air handler* is located completely within the continuous air barrier and within the building thermal envelope
- Duct leakage to the outside must be ≤ *1.5 cfm/100 sqft* of conditioned space
- Insulation above the buried ducts is greater than or equal to the difference between proposed ceiling insulation and duct insulation
  For example:
  - R-49 is proposed ceiling insulation
  - Duct insulation is R-8
  - Insulation above the ducts must be: R-49 – R-8 = R-41

105

Duct Tightness Verification

Prescriptive path only

2021 IECC Duct Leakage Requirement	
Type of Test	Maximum Leakage Rate
Rough-in test with air-handler	4 CFM/ 100 sq ft
Rough-in test without air handler	3 CFM/ 100 sq ft
Air Handler and Ducts in Conditioned space	8 CFM/100 sqft
Post-construction total leakage to outside	4 CFM/ 100 sq ft

***Exceptions:** On ERVs & HRVs not integrated in the heating and cooling ducts

Note: Total leakage to the outside test required when using ERI path

106

Duct Tightness Verification

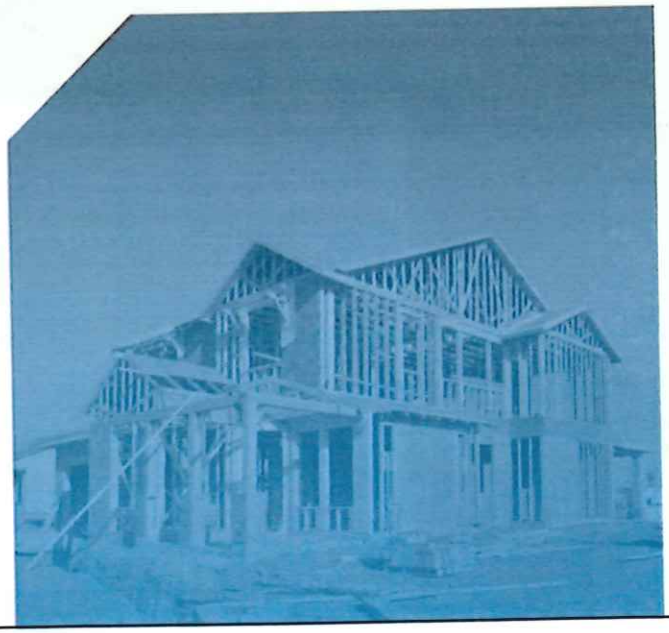
MA N1103.3.3: Testing and verification of ducts to be done by:

- Certified HERS Rater, or
- Certified HERS Field Inspector, or
- BPI Certified Professional

107

Duct Leakage Verification

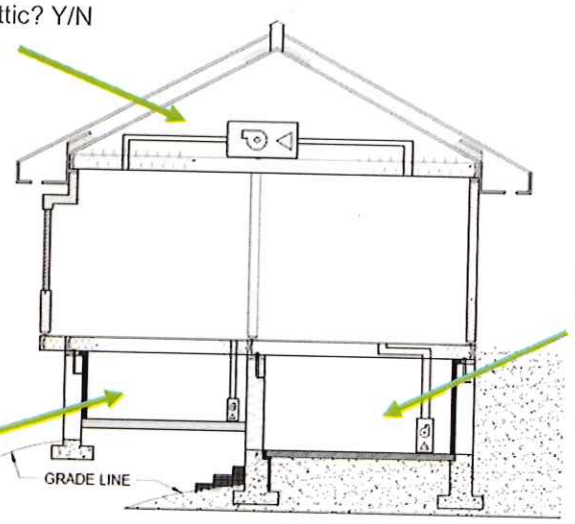
1. **Plan review:** Identify duct location
2. **Notify the applicant:** Issue duct sealing verification form with approved plans
3. **Final inspection checklist:** Add check box, "Duct Sealing Verification Form received"



108

Duct Leakage Verification
1. Identify Duct Location

Air handler or ducts in attic? Y/N



Air handler or ducts in basement? Y/N

Air handler or ducts in crawlspace? Y/N

109

Duct Leakage Verification
2. Issue Duct Verification Form

mass save

Duct tightness test required

3. Heating and Cooling System Duct Leakage

Duct leakage test

Testing company _____ Phone _____

Tester Name (print) _____ Signature _____

Date: _____

BPI or HERS Rater certification number BPI no. _____ HERS Rater no. _____

Duct location:

☐ The air handler or some portion of the ductwork is outside the thermal envelope.

☐ The air handler and all ducts are completely within the thermal envelop

Total duct leakage test (choose 1):

☐ Rough-in w/ air handler

☐ Post construction ☐ Rough-in w/o air handler

Duct leakage test result:

System 1:

Fan Flow at 25 Pascals (CFM25) _____ CFM

Conditioned Floor Area (CFA) served by system = _____ ft²

CFM25 / CFA x 100 = _____ CFM/100 ft²

System 2 (if present):

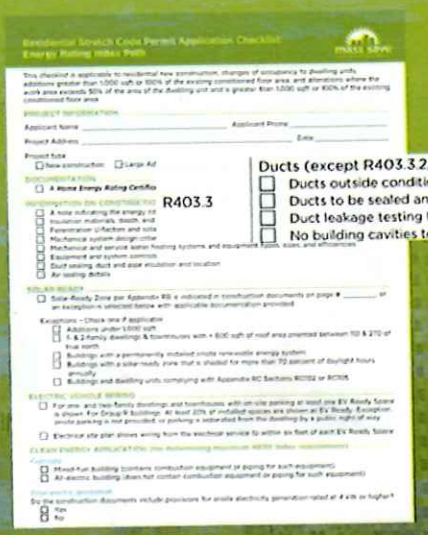
Fan Flow at 25 Pascals (CFM25) _____ CFM

Conditioned Floor Area (CFA) served by system = _____ ft²

CFM25 / CFA x 100 = _____ CFM/100 ft²

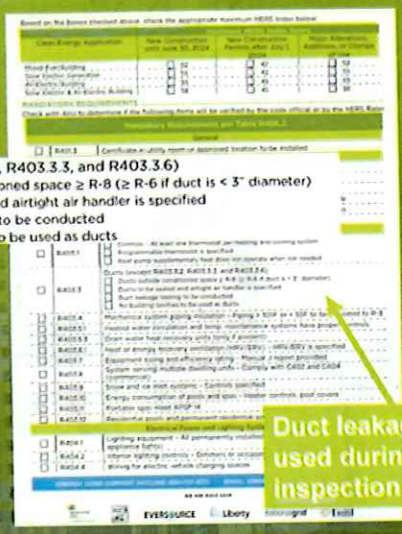
110

Duct Leakage Verification
3. Final Inspection Checklist



R403.3

Ducts (except R403.3.2, R403.3.3, and R403.3.6)
- ☐ Ducts outside conditioned space ≥ R-8 (≥ R-6 if duct is < 3" diameter)
- ☐ Ducts to be sealed and airtight air handler is specified
- ☐ Duct leakage testing to be conducted
- ☐ No building cavities to be used as ducts



Duct leakage section used during final inspection

111

Mechanical System Pipe Insulation (R403.4)

No change from 2018 IECC

Mechanical system piping capable of carrying fluids greater than 105° or less than 55° shall be insulated to an R-value of not less than R-3

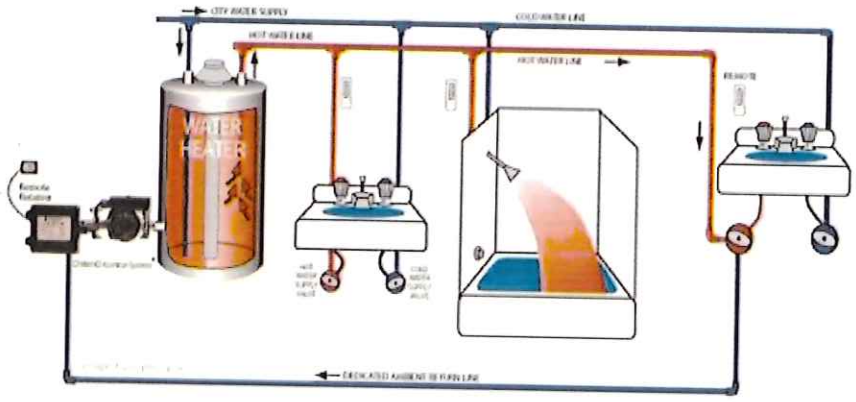
112

R403.5.1 Heated Water Circulation & Temperature (Mandatory)

Circulation Systems

Heated water circulation systems shall be provided with a circulation pump

The system return pipe shall be a dedicated return pipe or a cold water supply pipe

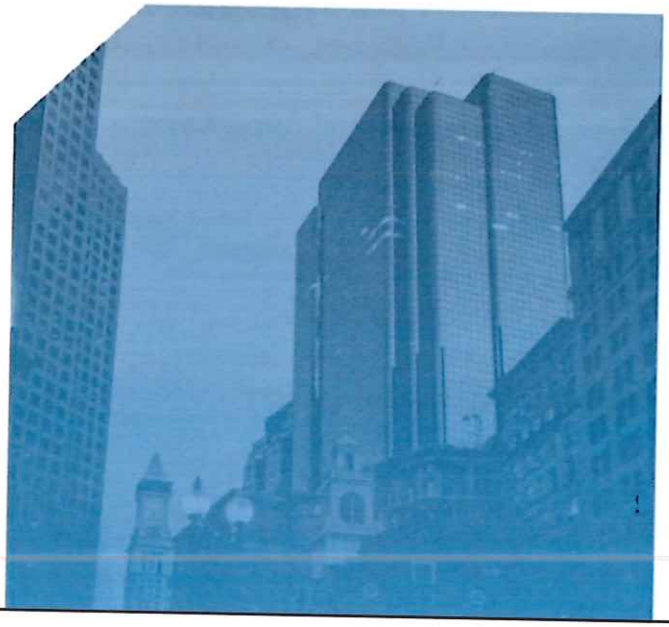


113

R403.5.1.1 Demand Recirculation Systems

Required if a recirculation pump pumps water from a heated water supply pipe back to the heated water source through a cold-water supply pipe. The following controls are required:

- Control shall start the pump based on fixture usage or flow of tempered water
- Control shall limit the temperature of water entering the cold-water piping to 104˚F



114

R403.5.2 Hot Water Pipe Insulation (Prescriptive)

2021 IECC Hot Water Pipe Insulation of R-3 required for:

1. Hot water piping ¾ inch nominal diameter and larger
2. Piping serving more than one dwelling unit
3. Piping located outside conditioned space (regardless of diameter)
4. Piping from water heater to distribution manifold
5. Piping located under a floor slab
6. Buried in piping
7. Supply and Return piping in circulation and recirculation systems other than cold water pipe return demand recirculation systems.

* Also required when using the ERI Alternative Path (per R406.2)

115

R403.6 Mechanical Ventilation (Amendment)

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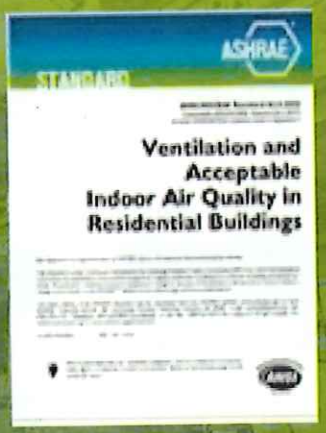
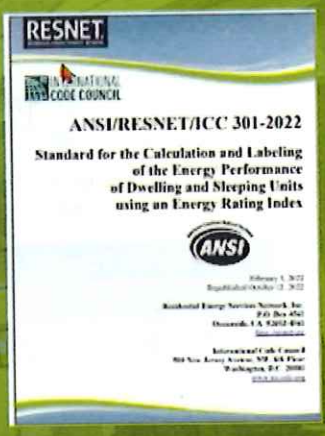
Minimum Air Flow to be determined by:

1. RESNET HERS Index in accordance with RESNET/ICC Standard 301, or
2. ASHRAE Standard 62.2-2019 or 62.2-2022, or
3. NEW: The following formula for one- and two-family dwellings and townhouses of three or less stories above grade plane:

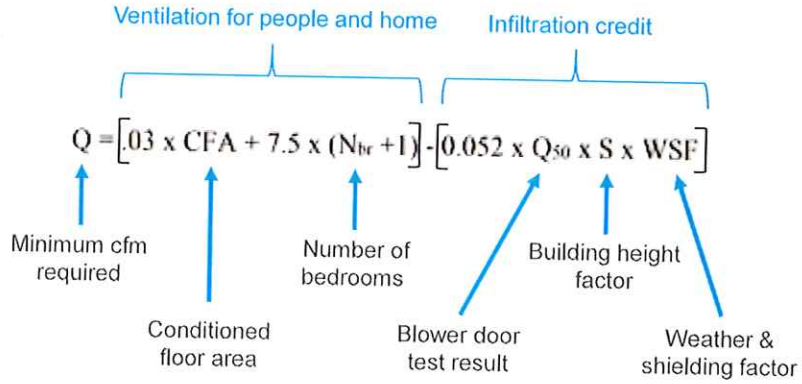




$$Q = .03 \times CFA + 7.5 \times (Nbr + 1) - 0.052 \times Q50 \times S \times WSF$$

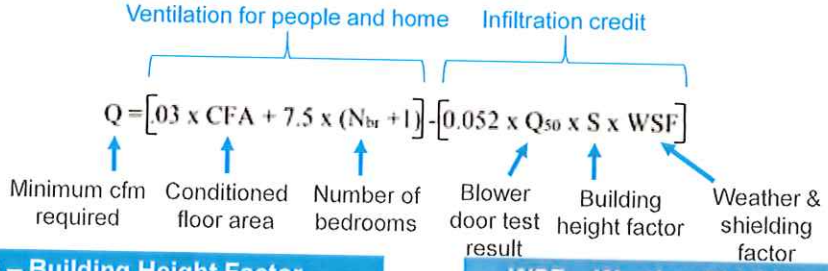
116

MA Amendment Formula



117

MA Amendment Formula



S – Building Height Factor			
Stories above grade	1	2	3
S	1.00	1.32	1.55

WSF – Weather Shielding Factor	
County	WSF
Barnstable	0.60
Berkshire	0.52
Bristol	0.54
Dukes	0.59
Franklin	0.52

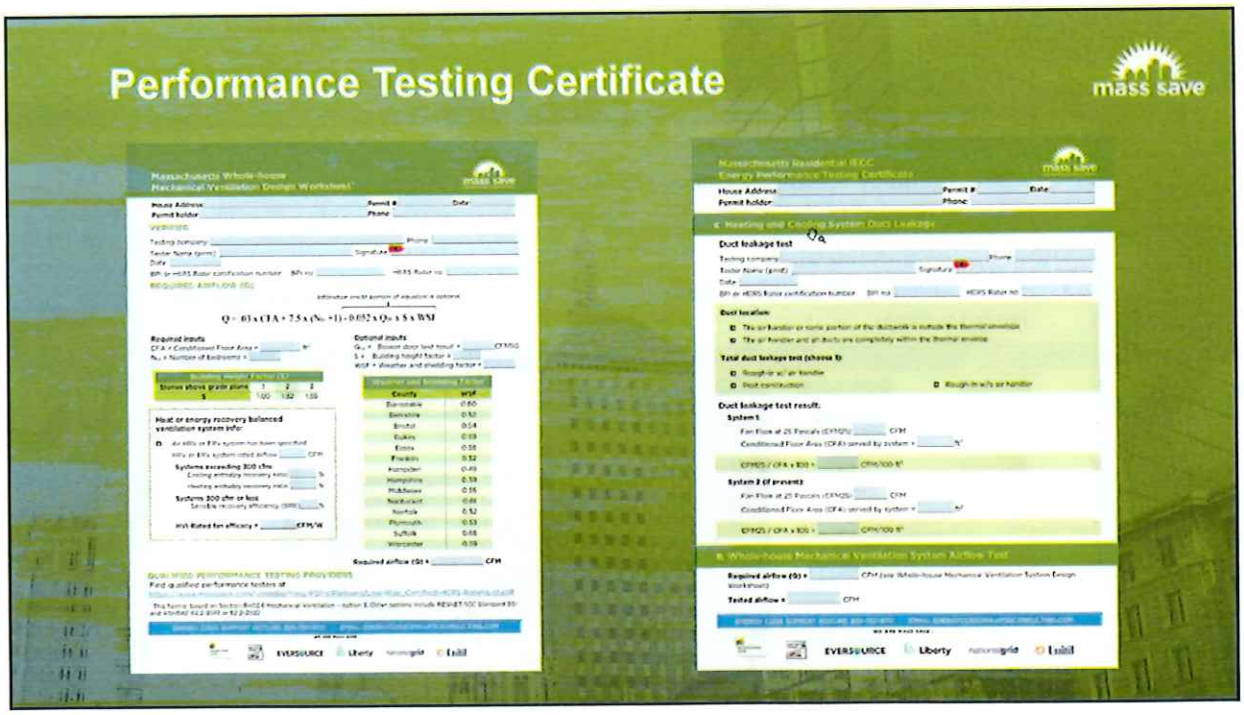
118

MA Amendment Formula

S – Building Height Factor			
Stories above grade	1	2	3
S	1.00	1.32	1.55

WSF – Weather Shielding Factor	
County	WSF
Barnstable	0.60
Berkshire	0.52
Bristol	0.54
Dukes	0.59
Essex	0.58
Franklin	0.52

119



120

Performance Testing Certificate

				Mechanical
☐	☐	☐	R403.1	☐ Controls – At least one thermostat per heating and cooling system ☐ Programmable thermostat is specified ☐ Heat pump supplementary heat does not operate when not needed
☐	☐	☐	R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6) ☐ Ducts outside conditioned space ≥ R-8 (≥ R-6 if duct is < 3" diameter) ☐ Ducts to be sealed and airtight air handler is specified ☐ Duct leakage testing to be conducted ☐ No building cavities to be used as ducts
☐	☐	☐	R403.4	Mechanical system piping insulation – Piping > 105F or < 55F to be insulated to R-3
☐	☐	☐	R403.5.1	Heated water circulation and temp. maintenance systems have proper controls
☐	☐	☐	R403.5.3	Drain water heat recovery units (only if present)
☐	☐	☐	R403.6.1	Heat or energy recovery ventilation (HRV/ERV) – HRV/ERV is specified
☐	☐	☐	R403.7	Equipment sizing and efficiency rating – Manual J report provided.
☐	☐	☐	R403.8	System serving multiple dwelling units – Comply with C403 and C404 (commercial)
☐	☐	☐	R403.9	Snow and ice melt systems – Controls specified

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Mechanical Ventilation Systems (HRV/ERV)

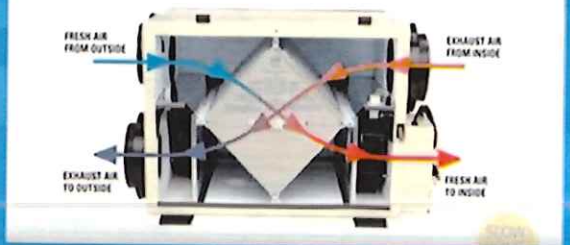
Large Systems (>300CFM)

- ≥ 50% Enthalpy Recovery Ratio – Cooling Design Condition
- ≥ 60% Enthalpy Recovery Ration – Heating Design Condition

Other Systems (≤300 CFM)

- ≥ 65% Sensible Recovery Ratio (SRE) @ 32°F at an airflow not less than the design airflow

HRV or ERV



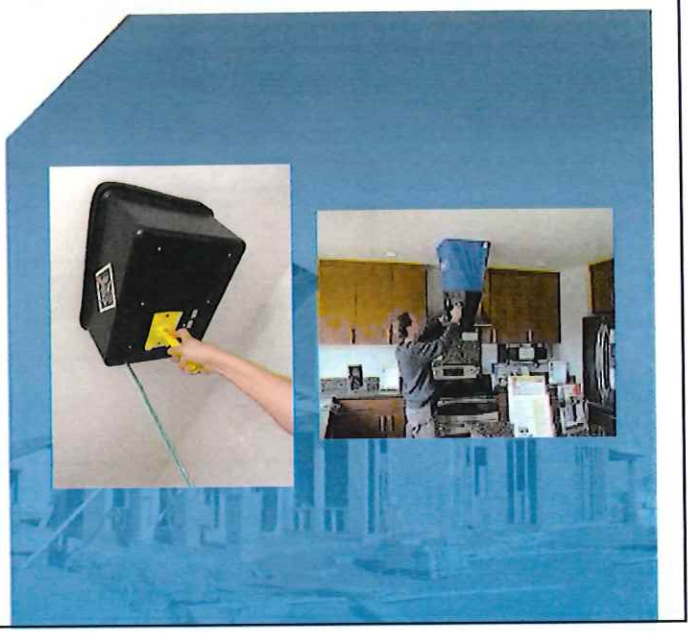
122

Mechanical Ventilation System Testing

Mechanical ventilation systems must be tested and verified to achieve minimum required ventilation rate

- This includes whole-house and local ventilation systems
- Exception: Kitchen range hoods ducted to the outside with 6-inch or larger duct and not more than one 90-degree elbow or equivalent.

Testing in accordance with the manufacturer's instructions, flow hood or box, flow grid or other airflow measuring device.



123

Related Code Sections

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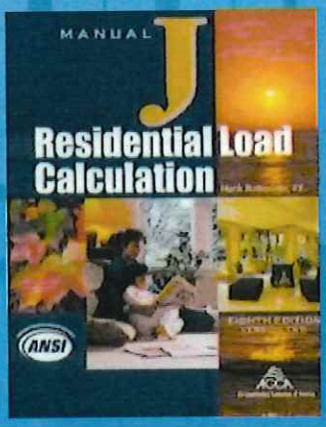
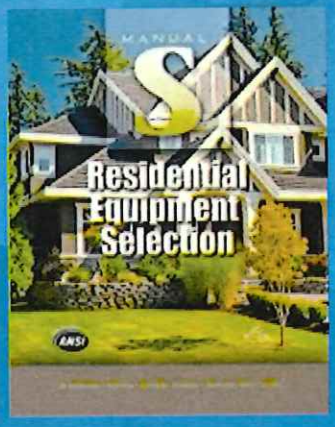
IECC 2021 Section R403.7

Heating and cooling equipment shall be:

- **Sized in accordance with ACCA Manual S**
- **Based on building loads calculated in accordance with ACCA Manual J**



Manual J – Residential Load Calculations (R403.7)

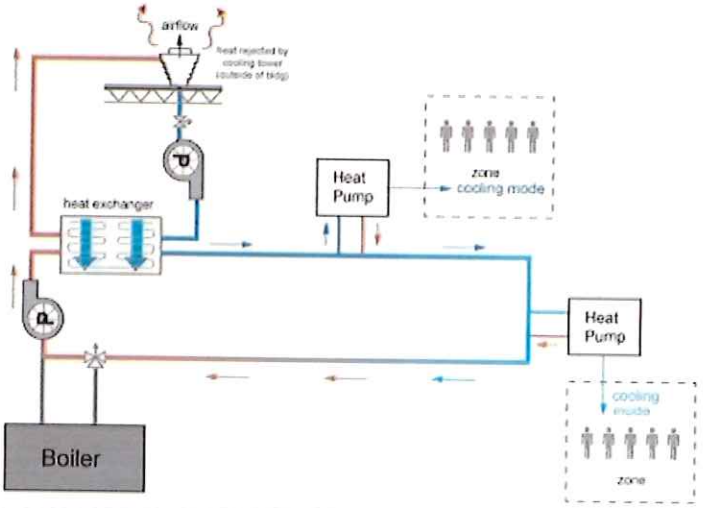


Manual S – Equipment Sizing (R403.7)

124

R403.8 Systems Serving Multiple Dwelling Units

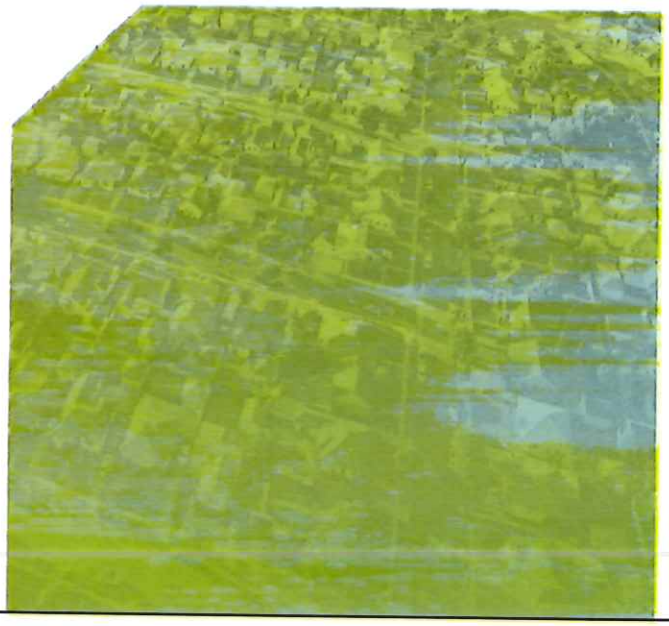
Systems serving multiple dwelling units shall comply with Sections C403 and C404 of the IECC commercial provisions *INSTEAD* of Section R403



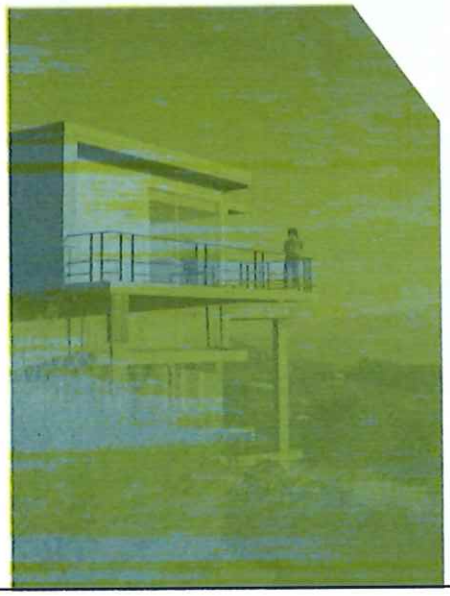
125

Snow Melt and Ice Systems Controls (R403.9)

- No change from 2018 IECC
- Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is greater than 50°F and precipitation is not falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is greater than 40°F.



126



Pools and Permanent Spas (R403.10)

- No change from 2018 IECC
- On-Off Switch / mounted on outside of heater with ready access or within 3 ft of heater.
- Switch will not change setting of thermostat
- No continuous burning pilot lights
- Time switches turn off heaters and pumps unless they are built in.
  - Except/ public health requires 24 hr operation.
  - Except/ pumps that operate solar- waste heat recovery systems
- Covers on outdoor heated pools and spas
  - With exceptions

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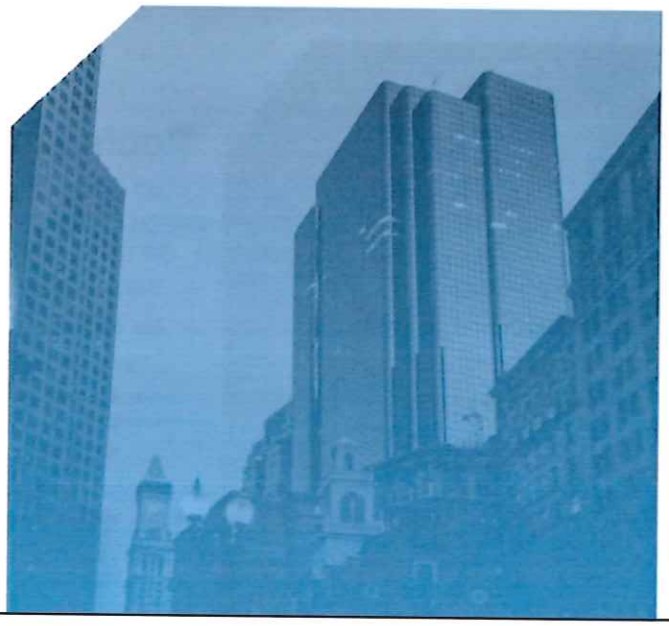
Electrical Power and Lighting Systems

128

R404.1 Lighting Equipment

All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy lighting sources

Type	Minimum Efficacy
Luminaires	45 lumens per watt
Lamps	65 lumens per watt



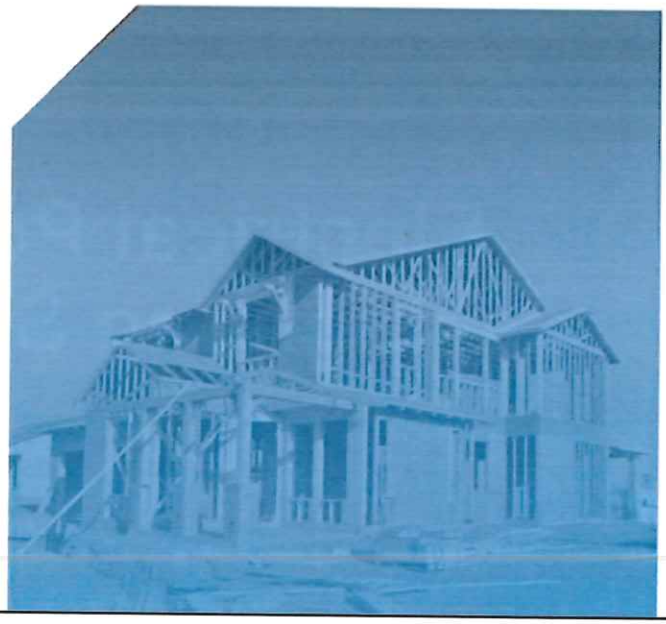
129

R404.4 Wiring for Electric Vehicle Charging Spaces

("EV Ready Spaces")

EV Ready Spaces shall be provided in accordance with Table R404.4

- The dedicated branch circuit shall be identified as "EV READY" in the service panel or subpanel directory, and the termination location shall be marked as "EV READY."
- The circuit shall terminate in a NEMA receptacle, outlet or a Society of Automotive Engineers (SAE) standard J1772 electrical connector.



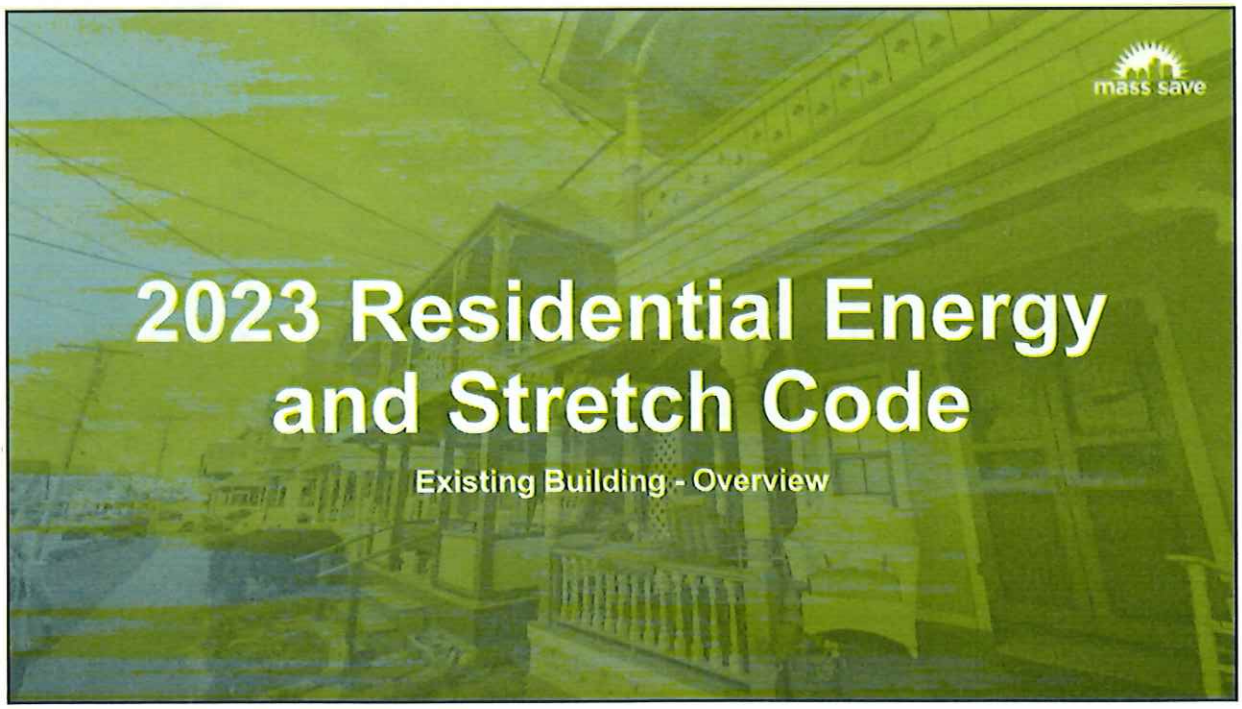
130

EV Ready Spaces

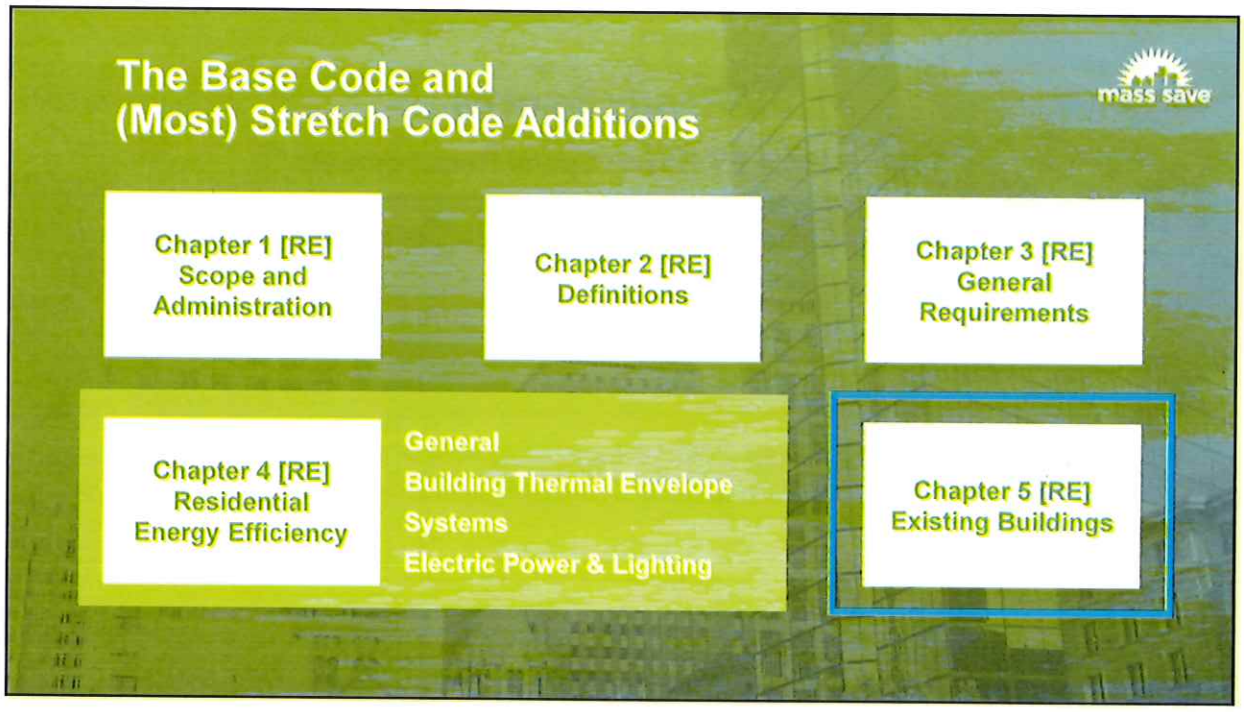
Table R404.4 EV Ready Space Requirements

Type of Building	Number of spaces	Wiring Requirement
1 & 2 Family Dwellings and Townhomes	At least one EV Ready Space per dwelling unit	50 Amp circuit provided
All other R-use Buildings	At least 20% of spaces	40-amp, 208/240-volt circuit with a minimum capacity of 9.6 kVA

131



132


The Base Code and
(Most) Stretch Code Additions
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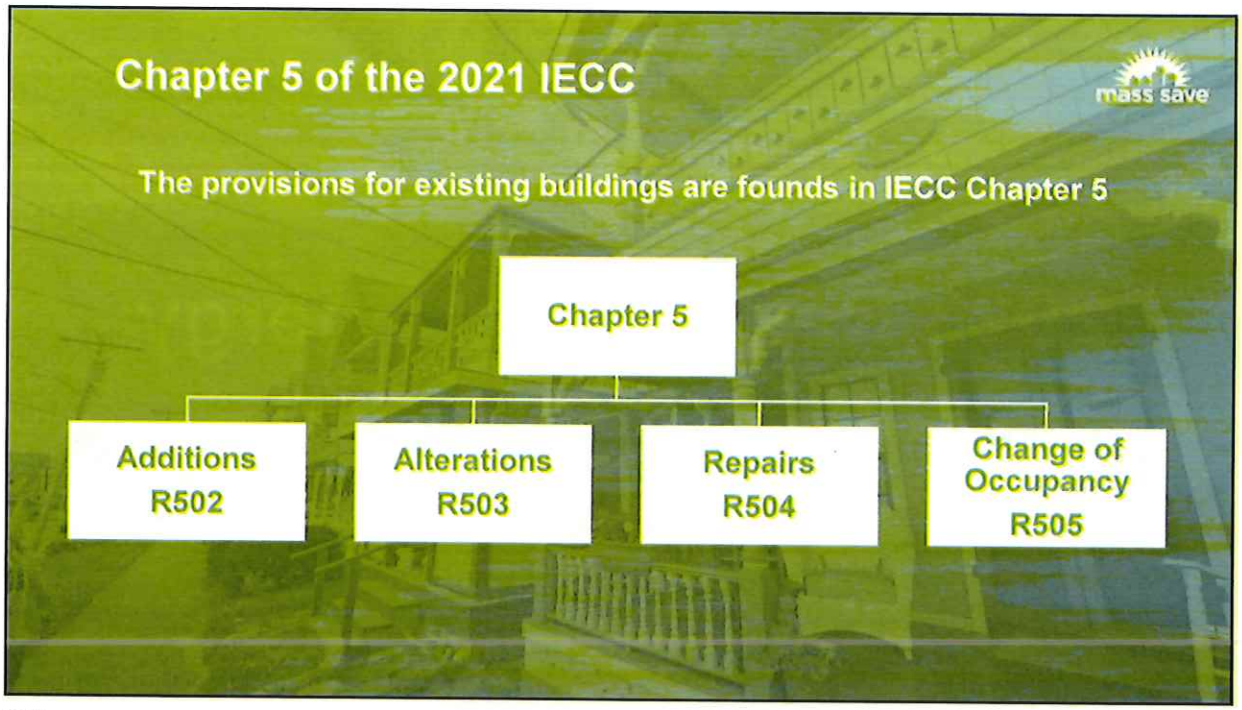
Chapter 1 [RE]
Scope and
Administration
Chapter 2 [RE]
Definitions
Chapter 3 [RE]
General
Requirements
Chapter 4 [RE]
Residential
Energy Efficiency
General
Building Thermal Envelope
Systems
Electric Power & Lighting
Chapter 5 [RE]
Existing Buildings

133


Chapter 5 of the 2021 IECC
mass save
The provisions for existing buildings are founds in IECC Chapter 5
Chapter 5
Additions
R502
Alterations
R503
Repairs
R504
Change of
Occupancy
R505

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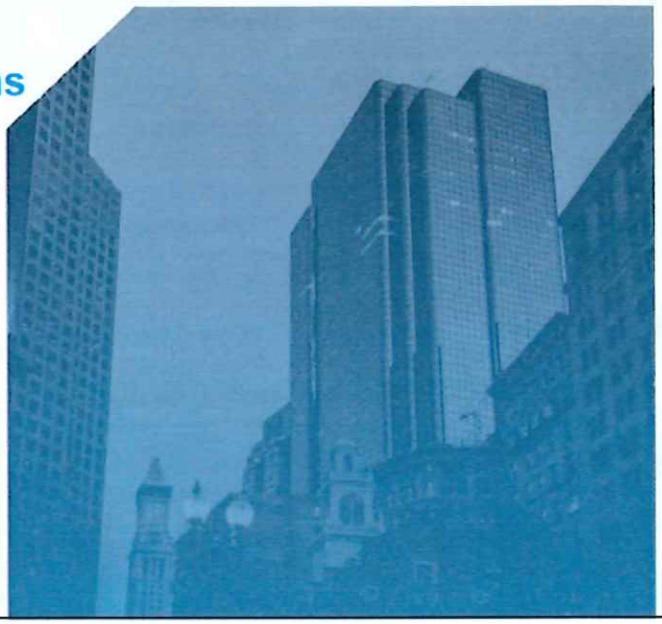
Chapter 5 – Existing Building(s) Definitions



Additions: An extensions or increase in the conditioned space floor area, number of stories or height of a building or structure.

Alterations: Any construction, retrofit or renovation to an existing structure other than repairs or additions.

Repairs: The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

Changes of occupancy or use: Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuels or electrical energy.

135

Compliance Paths – Existing Buildings

Additions & Change of Use

- Prescriptive Compliance or
- Comply with Table 406.5 HERS Index (Mandatory greater than 1000sqft or 100% of Existing Floor Area)

Alterations

- Prescriptive compliance or
- Comply with Table 406.5 HERS Index Level 3 alteration greater than 1000sqft

Alterations Continued

- Exceptions: storm windows, roof recover, construction where roof, wall or floor cavities not exposed, etc.

Repairs (exempt)

- Including glass-only replacements, roof repairs, lighting replacement within existing luminaires

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Existing Buildings

R501.1.1 General

- Unaltered portions of the existing building or system shall not be required to comply
- This code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use of an existing building
  - Provided it was legal when it was built

R501.2 Compliance

- Additions, alterations, repairs, or changes in occupancy to, or relocation of, an existing building, building system, or portion thereof shall comply with Section 502, 503, 504, or 505, respectively. Changes where unconditioned space is changed to conditioned space shall Comply with section 502.

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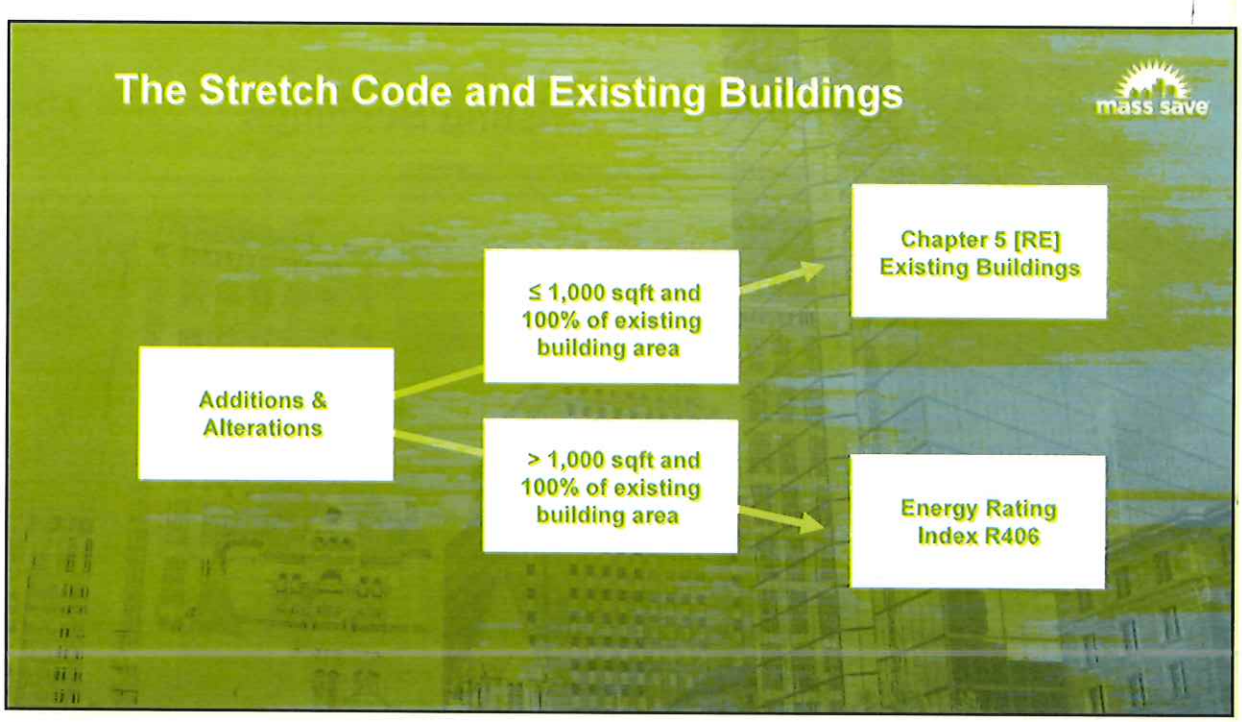
The Stretch Code and Existing Buildings



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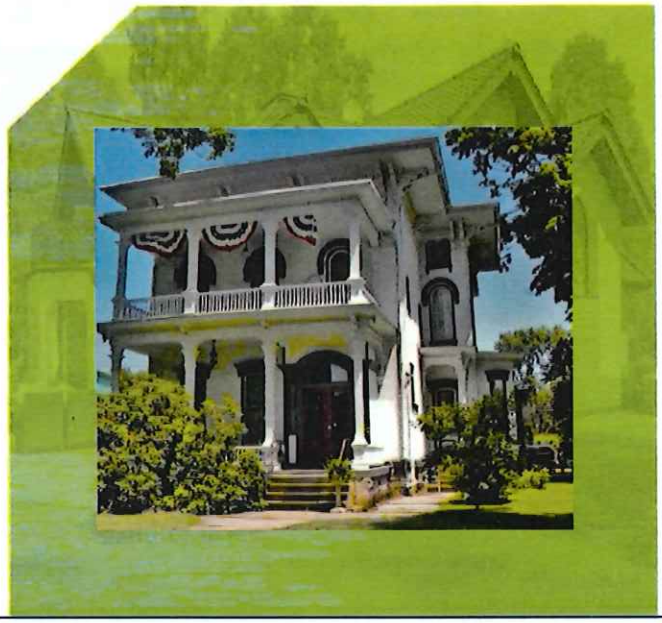
Historic Buildings

R501.6 Energy code does not apply ***provided***:

- A report is submitted to the code official demonstrating that compliance with a provision would threaten, degrade or destroy the historic form, fabric or function of the building
- The report must be signed by one of the following:
  - Owner
  - Registered design professional
  - Rep of the State Historic Preservation Office or historic preservation AHJ



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Additions: Compliance Options

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Section R502

- Prescriptive Compliance (*Small Additions & Alterations Only*)
  - Building Envelope
  - Heating & Cooling Systems
  - Service Hot Water Systems
  - Lighting
- HERS Index
  - Existing + Addition (Unconditioned to Conditioned spaces)

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Table R406.5 Maximum Energy Rating Index

Clean Energy Application	New Construction Starts January 1, 2023, until June 30, 2024	New Construction Permits After July 1, 2024	Major Alterations, Additions, and Changes. Starts January 1, 2023
Mixed-Fuel Building	52	42	52
Solar Electric Generation*	55	42	55
All-Electric Building	55	45	55
Solar Electric* and All-Electric Building	58	45	58

**Solar Electric Generation = Solar photovoltaic array rated at 4kW or higher HERS numbers for Additions Alterations Plus the Existing Home, unless can be tested separately.*

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R406.5.1 Trade-Off for Clean Energy Systems

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New construction following Section R406, or existing buildings and additions following IECC chapter 5[RE] may use clean energy trade-offs to increase the maximum allowable HERS rating for each unit separately served by any combination of the following:

1. Solar Electric Generation: Solar photovoltaic array rated at 4kW or higher shall offset 3 HERS points for Level 3 alterations, Change of use to Residential R-use categories or for fully attached additions.
2. All-Electric Buildings shall offset 3 HERS points for each dwelling unit in new construction, Level 3 alterations, change of use to Residential R-use categories and fully attached additions.

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ERI Alternative Paths

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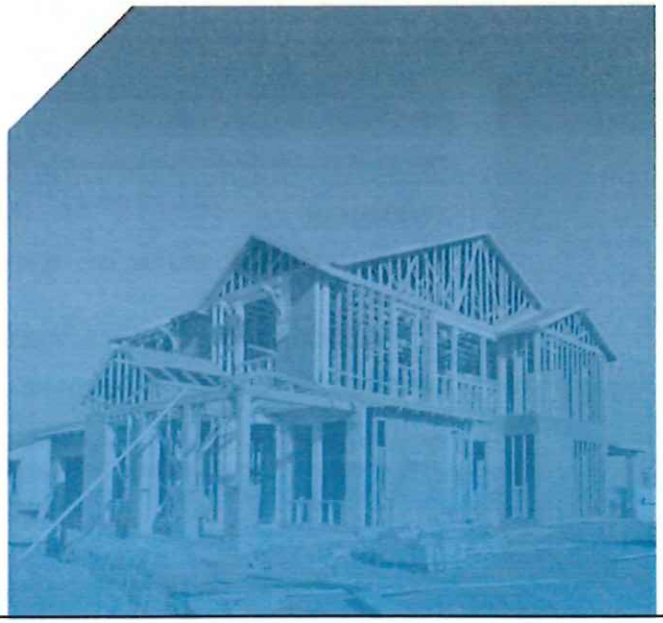
Passive House Building Certification Option

- Projects may document compliance with either PHIUS certification or PHI certification.
- Must use the most recent version of the software for the Passive House approach

R405.2 R405.3



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Mass Save Multifamily Passive House Incentives

Passive House Incentive Structure for Multi-Family (5 Units or More)			
Incentive Timing	**Type of Building**	**Number of spaces**	**Wiring Requirement**
Pre-Construction	Feasibility Study	100% Feasibility costs	$5,000
	Energy Modeling	75% of Energy Modeling costs	$500/Unit, max. $20,000
	Pre-Certification	$500/unit	N/A
Post-Construction	Certification	$2,500/unit	
	Net Performance Bonus	$0.75/kWh	
		$7.50/therm	

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Appendix RC Massachusetts Municipal Opt-In Specialized Stretch Code 2023

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225 CMR 22: MASSACHUSETTS RESIDENTIAL STRETCH ENERGY CODE AND MUNICIPAL OPT-IN SPECIALIZED CODE 2023

Appendix RC revise the Appendix RC title and notes as follows:

APPENDIX RC

MASSACHUSETTS MUNICIPAL OPT-IN SPECIALIZED STRETCH CODE 2023

RESIDENTIAL LOW-RISE BUILDING PROVISIONS

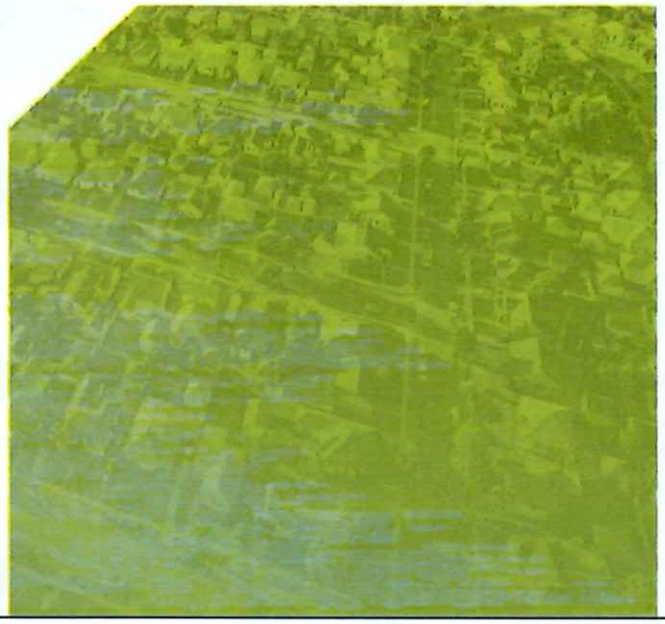
The provisions contained in this appendix together with referenced sections from the Stretch energy code constitute the Specialized opt-in code for residential low-rise buildings, and may be adopted by a city or town together with the Commercial Specialized code Appendix CC as their stretch energy code. When adopted by the local municipality, the provisions in this appendix are mandatory in combination with the IECC2021 with Massachusetts Stretch code amendments.

146

Municipal Specialized Opt-In Code

The Specialized Stretch Code…

- Includes net-zero building performance standards
- Is designed to achieve MA GHG emissions limits
- Requires compliance with the Stretch Code
- Requires pre-wiring for future electrification of space and water heating for homes with fossil fuels
- Is adopted at the local level but is NOT required for participation in Green Communities



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Specialized Code Pathways

Meet the Stretch Code + Follow One Specialized Code Pathway

Zero Energy Pathway RC201	All-electric Pathway RC 103	Mixed-fuel Pathway RC104 and RC105
• HERS 0 or Phius ZERO	• HERS 45 • No requirements beyond the Stretch Code	• HERS 42 • Pre-wiring for electrification • Onsite renewable energy

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Specialized Code Pathways

Allowable pathways depend on:

- Dwelling unit or building floor area
- Presence or absence of fossil fuels or fossil fuel piping

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Specialized Code Requirement Summary

TABLE 2: Residential Specialized code requirements summary by building/dwelling unit size

Building Size	Fuel Type	Minimum Efficiency	Electrification	Min. EV wiring	Renewable Generation
Dwelling units up to 4,000 sf	All Electric	HERS 45 or Phius CORE or PHI	Full	1 parking space	Optional
Dwelling units up to 4,000 sf	Mixed-fuel	HERS 42 or Phius CORE or PHI	Pre-wiring	1 parking space	Solar PV (except shaded sites)
Dwelling units > 4,000 sf	All Electric	HERS 45 or Phius CORE or PHI	Full	1 parking space	Optional
Dwelling units > 4,000 sf	Mixed-fuel	HERS 0 or Phius ZERO	Pre-wiring	1 parking space	Solar PV or other renewables
Multi-family >12,000 sf	All Electric	Phius CORE or PHI	Full	20% of spaces	Optional
Multi-family >12,000 sf	Mixed-fuel	Phius CORE or PHI	Pre-wiring	20% of spaces	Optional

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Summary

All stretch code homes must follow one of the following paths:

- **Prescriptive Compliance Option**
  - Compliance with Sections R401-R404, R408, and Appendix RB
- **Passive House Building Certification Option**
  - Compliance with Section R405, R404.4 and Appendix RB
- **Energy Rating Index Option**
  - Compliance with Section R406, R403.6, R404.4 and Appendix RC
- **Appendix RC, Municipal Opt-In Specialized Code**
  - Compliance with Appendix RC and R404 as amended

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Summary

- Requirements formerly known as "mandatory" are found in [MA] Table R406.2
- These requirements are found in the 2021 IECC and MA Amendments
- Important new requirements
  - Retainers to prevent loose-fill insulation from spilling from one attic level to another
  - Total leakage test required for all new duct systems
  - HRV/ERV required for all new homes
  - Interior and exterior lighting controls
  - Electric vehicle readiness
- HRV/ERV are required and must be tested to verify flow rate
- To be eligible for HERS Index credits all-electric homes, high-efficiency electric HVAC and DHW equipment must be specified

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Summary

For those complying with the ERI Path:

- A Home Energy Rating Certificate (based on plans) must be provided to obtain a permit.
- A Home Energy Rating Certificate (final) must be provided to obtain a certificate of occupancy.
- Renewable energy and clean space heating may be used to increase the target HERS Index
- Insulation must achieve a Grade I installation
- All IECC requirements in Table R406.2 must be met, including:
  - The IECC Air Barrier Insulation Installation Criteria
  - Blower door test max. 5 ACH50
  - Total duct leakage test
- Duct leakage to outside test required per ICC/RESNET 301
- Pipe insulation requirements must be met.

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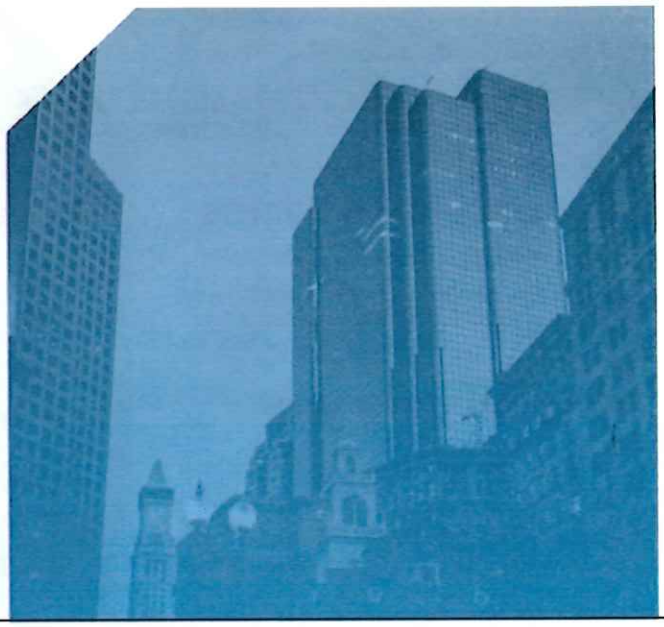
Post Webinar Survey

Shortly after this webinar all attendees will be sent a short survey.

We would appreciate it if you took a few minutes and let us know how we are doing.

We appreciate all feedback!



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Energy Code Support

Questions about the energy code?

Energy Code Support Hotline:

855-757-9717

Energy Code Support Email:

energycodesma@psdconsulting.com

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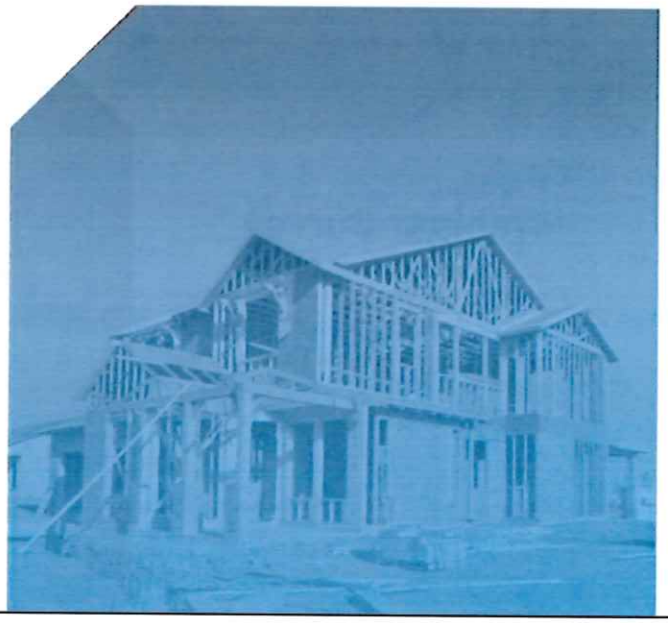
Upcoming Events

TBD

To schedule a private event for your organization, email your request to energycodesma@psdconsulting.com

Register at masssave.com/energycode



157

Residential New Construction

Five incentive paths that cover new construction and renovation projects with multiple fuel types, multiple Program Administrators and both commercial and residential meters

Incentives are ***performance-based*** for incorporating high-performance upgrades that go beyond minimum building code requirements

Program also features a ***Passive House & All-Electric Homes workforce training initiative*** to promote workforce development and market transformation in the energy efficiency and residential building construction industry.

ICF serves as single point of contact Lead Vendor for all statewide Sponsors

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EVERSOURCE Liberty nationalgrid Unitil

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Residential New Construction

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Low Rise New Construction

- 1-4 unit homes and 5+ unit multi-family ≤ 3 Stories and residential-metered heat
- Enrollment via program-approved HERS rater

All-Electric Homes

- Single Family and 2-4 unit new construction homes
- All-Electric heating, cooling, water heating and cooking
- Enrollment via program-approved HERS rater

Renovations & Additions

- 1-4 unit homes and 5+ unit multi-family ≤ 3 Stories and residential-metered heat
- Major renovations & large additions
- Enrollment via program-approved HERS rater

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Residential New Construction

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High Rise New Construction

- 4+ stories and 5+ units with residential-metered heat [or] all multi-family buildings with master-metered heat
- Enrollment via program Account Manager

Passive House

- New Construction multi-family buildings of 5+ units pursuing Passive House Certification (PHI or PHIUS)
- Enrollment via program Account Manager

Passive House & All-Electric Homes Training

- Enrollment online via Energy Efficiency Learning Center
- 50% cost reimbursement upon completion of Passive House professional accreditations (PHI or PHIUS)

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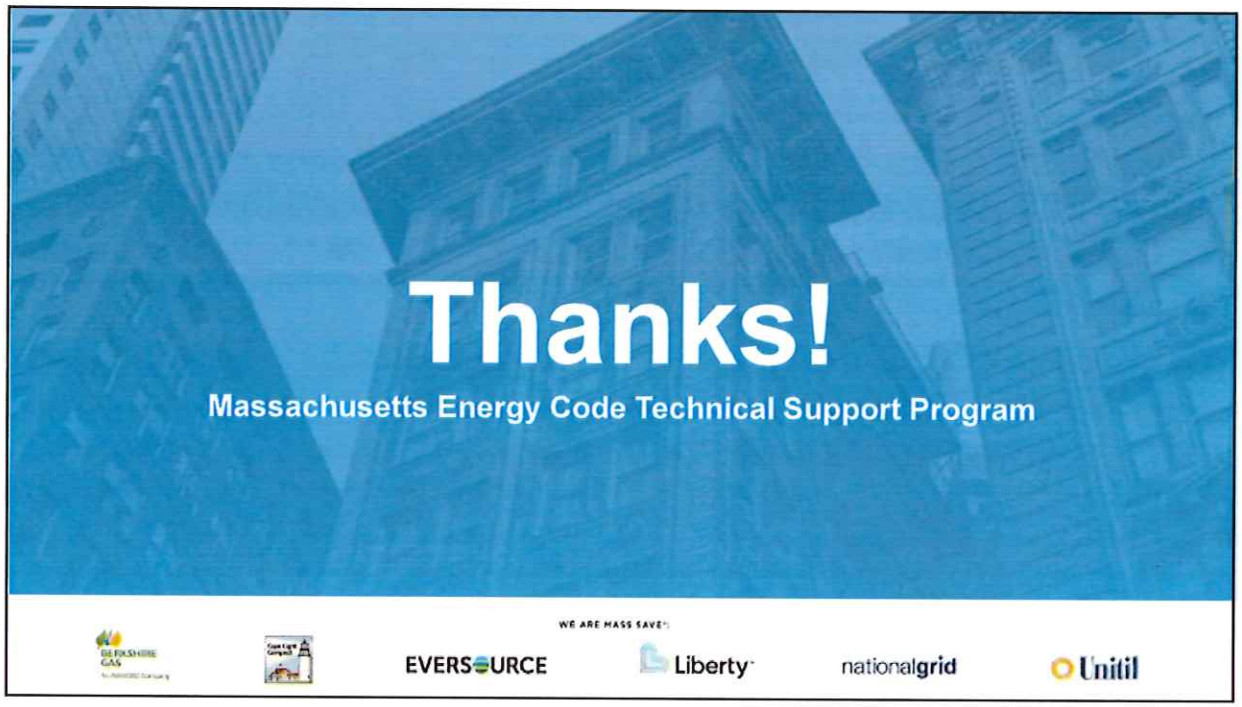
Thanks!
Massachusetts Energy Code Technical Support Program
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Liberty
nationalgrid
Unitil

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Residential Stretch Plan Review Checklist: Energy Rating Index Path

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Savings through energy efficiency

This checklist is applicable to residential new construction, changes of occupancy to dwelling units, additions greater than 1,000 sqft or 100% of the existing conditioned floor area, and alterations where the work area exceeds 50% of the area of the dwelling unit and is greater than 1,000 sqft or 100% of the existing conditioned floor area.

PROJECT INFORMATION

Applicant Name: _____ Applicant Phone: _____

Project Address: _____ Date: _____

Project type:

☐ New construction ☐ Large Addition ☐ Extensive Alteration ☐ Changes of Occupancy or Use

DOCUMENTATION

☐ A ***Home Energy Rating Certificate – Projected Report – Based on Plans*** has been provided.

INFORMATION ON CONSTRUCTION DOCUMENTS (R103.2)

☐ A note indicating the energy code compliance path is the Energy Rating Index Path
☐ Insulation materials, depth, and R-values
☐ Fenestration U-factors and solar heat gain coefficients (SHGC)
☐ Mechanical system design criteria (Manual J, Manual D, and Manual S reports)
☐ Mechanical and service water heating systems and equipment types, sizes, and efficiencies
☐ Equipment and system controls
☐ Duct sealing, duct and pipe insulation and location
☐ Air sealing details

SOLAR-READY

☐ Solar-Ready Zone per Appendix RB is indicated in construction documents, or an exception is selected below with applicable documentation provided.

Exceptions – Check one if applicable:

☐ Additions under 1,000 sqft
☐ 1- & 2-family dwellings & townhouses with < 600 sqft of roof area oriented between 110 & 270 of true north
☐ Buildings with a permanently installed onsite renewable energy system
☐ Buildings with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually
☐ Buildings and dwelling units complying with Appendix RC Sections RC102 or RC105

ELECTRIC VEHICLE WIRING

☐ For one- and two-family dwellings and townhouses with on-site parking at least one EV Ready Space is shown. For Group R buildings: At least 20% of installed spaces are shown as EV Ready. Exception: onsite parking is not provided, or parking is separated from the dwelling by a public right of way.

☐ Electrical site plan shows wiring from the electrical service to within six feet of each EV Ready Space

CLEAN ENERGY APPLICATION:

Fuel type:

☐ Mixed-fuel building (contains combustion equipment or piping for such equipment)
☐ All-electric building (does not contain combustion equipment or piping for such equipment)

Solar electric generation

Do the construction documents include provisions for onsite electricity generation rated at 4 kW or higher?

☐ Yes
☐ No

revd 3.19.2024

Based on the boxes checked above, check the appropriate maximum HERS Index below:

Clean Energy Application	Maximum HERS Index Score		
	New Construction until June 30, 2024	New Construction Permits after July 1, 2024	Major Alterations, Additions, or Change of Use
Mixed-Fuel Building	☐ 52	☐ 42	☐ 52
Solar Electric Generation	☐ 55	☐ 42	☐ 55
All-Electric Building	☐ 55	☐ 45	☐ 55
Solar Electric & All-Electric Building	☐ 58	☐ 45	☐ 58

MANDATORY REQUIREMENTS

Check with AHJ to determine if the following items will be verified by the code official or by the HERS Rater.

Complies? Y	N	NA	Mandatory Requirements per Table R406.2	
			General	
☐	☐	☐	R401.3	Certificate in utility room or approved location to be installed
			Building Thermal Envelope	
☐	☐	☐	R402.1.1	Vapor retarders installed per MA Residential Code R702.7
☐	☐	☐	R402.2.3	Eave Baffles to be installed in each bay
☐	☐	☐	R402.2.4.1	Access hatches and doors to have retainer for loose-fill insulation
☐	☐	☐	R402.2.10.1	Crawl space wall insulation installation installed per MA Residential Code
☐	☐	☐	R402.4.1.1	Installation – Air barrier and insulation installation criteria shown on plans
☐	☐	☐	R402.4.1.2	Testing – Blower door test to be performed. Max 5 ACH50.
			Mechanical	
☐	☐	☐	R403.1	☐ Controls – At least one thermostat per heating and cooling system ☐ Programmable thermostat is specified ☐ Heat pump supplementary heat does not operate when not needed
☐	☐	☐	R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6) ☐ Ducts outside conditioned space ≥ R-8 (≥ R-6 if duct is < 3" diameter) ☐ Ducts to be sealed and airtight air handler is specified ☐ Duct leakage testing to be conducted ☐ No building cavities to be used as ducts
☐	☐	☐	R403.4	Mechanical system piping insulation – Piping > 105F or < 55F to be insulated to R-3
☐	☐	☐	R403.5.1	Heated water circulation and temp. maintenance systems have proper controls
☐	☐	☐	R403.5.3	Drain water heat recovery units (only if present)
☐	☐	☐	R403.6.1	Heat or energy recovery ventilation (HRV/ERV) – HRV/ERV is specified
☐	☐	☐	R403.7	Equipment sizing and efficiency rating – Manual J report provided.
☐	☐	☐	R403.8	System serving multiple dwelling units – Comply with C403 and C404 (commercial)
☐	☐	☐	R403.9	Snow and ice melt systems – Controls specified
☐	☐	☐	R403.10	Energy consumption of pools and spas – Heater controls, pool covers
☐	☐	☐	R403.11	Portable spas meet APSP 14
☐	☐	☐	R403.12	Residential pools and permanent residential spas meet APSP 15
			Electrical Power and Lighting Systems	
☐	☐	☐	R404.1	Lighting equipment – All permanently installed lighting to be LED (except kitchen appliance lights)
☐	☐	☐	R404.2	Interior lighting controls – Dimmers or occupant sensors specified
☐	☐	☐	R404.4	Wiring for electric vehicle charging spaces

Residential Stretch Code Permit Application Checklist: Energy Rating Index Path

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Savings through energy efficiency

This checklist is applicable to residential new construction, changes of occupancy to dwelling units, additions greater than 1,000 sqft or 100% of the existing conditioned floor area, and alterations where the work area exceeds 50% of the area of the dwelling unit and is greater than 1,000 sqft or 100% of the existing conditioned floor area.

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☐ Electrical site plan shows wiring from the electrical service to within six feet of each EV Ready Space

CLEAN ENERGY APPLICATION (for determining maximum HERS Index requirement)

Fuel type:

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☐ All-electric building (does not contain combustion equipment or piping for such equipment)

Solar electric generation

Do the construction documents include provisions for onsite electricity generation rated at 4 kW or higher?

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revd 3.19.2024

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☐	R402.2.3	Eave baffles to be installed in each bay
☐	R402.2.4.1	Access hatches and doors to have retainer for loose-fill insulation
☐	R402.2.10.1	Crawl space wall insulation installation installed per MA Residential Code
☐	R402.4.1.1	Installation – Air barrier and insulation installation details shown on plans
☐	R402.4.1.2	Testing – Blower door test to be performed. Max 5 ACH50.
Mechanical		
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☐	R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6) ☐ Ducts outside conditioned space ≥ R-8 (≥ R-6 if duct is < 3" diameter) ☐ Ducts to be sealed and airtight air handler is specified ☐ Duct leakage testing to be conducted ☐ No building cavities to be used as ducts
☐	R403.4	Mechanical system piping insulation – Piping > 105F or < 55F to be insulated to R-3
☐	R403.5.1	Heated water circulation and temp. maintenance systems have proper controls
☐	R403.5.3	Drain water heat recovery units (only if present)
☐	R403.6.1	Heat or energy recovery ventilation (HRV/ERV) – HRV/ERV is specified
☐	R403.7	Equipment sizing and efficiency rating – Manual J report provided.
☐	R403.8	System serving multiple dwelling units – Comply with C403 and C404 (commercial)
☐	R403.9	Snow and ice melt systems – Controls specified
☐	R403.10	Energy consumption of pools and spas – Heater controls, pool covers
☐	R403.11	Portable spas meet APSP 14
☐	R403.12	Residential pools and permanent residential spas meet APSP 15
Electrical Power and Lighting Systems		
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☐	R404.2	Interior lighting controls – Dimmers or occupant sensors specified
☐	R404.4	Wiring for electric vehicle charging spaces